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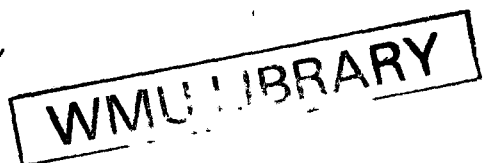
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WORLD MARITIME UNIVERSITY  
MALMO - SWEDEN



**THE ROLE OF SEA TRANSPORT  
IN THE ECONOMIC DEVELOPMENT  
IN INDONESIA**

By  
MOCH. LUKMANSYAH  
INDONESIA

A paper submitted to the Faculty of the World Maritime University in partial satisfaction of the requirements for the award of a

MASTER OF SCIENCE DEGREE  
in  
GENERAL MARITIME ADMINISTRATION

The contents of this Paper reflect my personal views and are not necessarily endorsed by the UNIVERSITY

Signature: *M. Lukmansyah* -  
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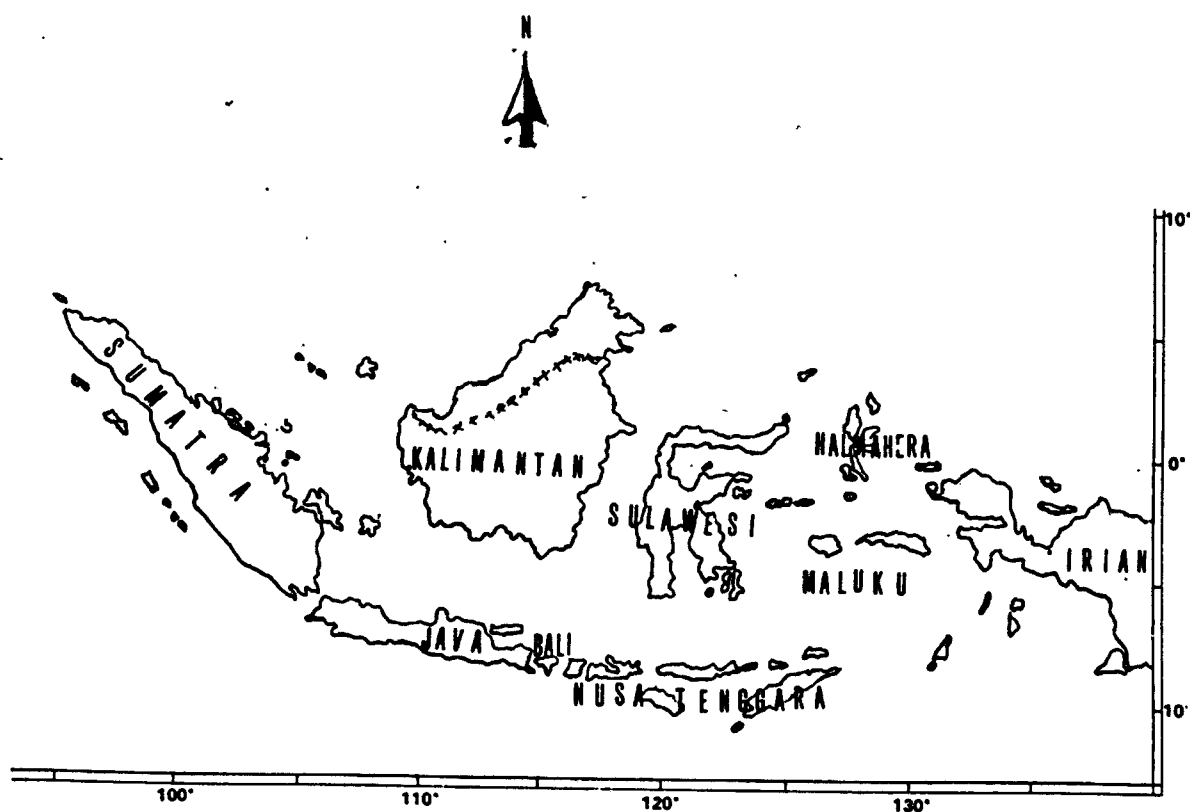
Besm El-Lah El-Rahman EL-Rahim



By The Name Of The Beneficent, Merciful God

# WORLD MARITIME UNIVERSITY

## THE ROLE OF SEA TRANSPORT IN THE ECONOMIC DEVELOPMENT IN INDONESIA



## ACKNOWLEDGEMENT

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MALMO - SWEDEN

October 1986

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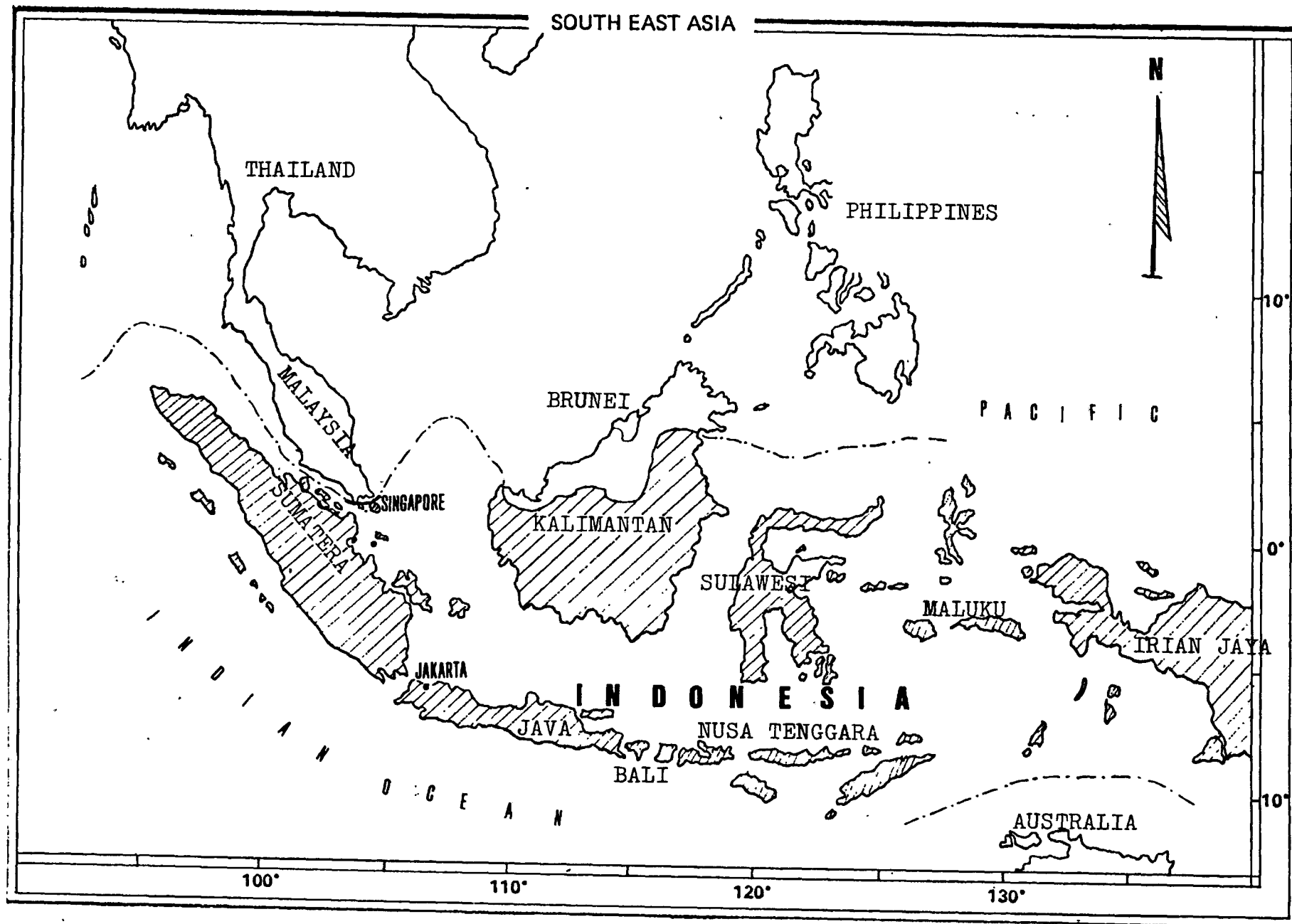
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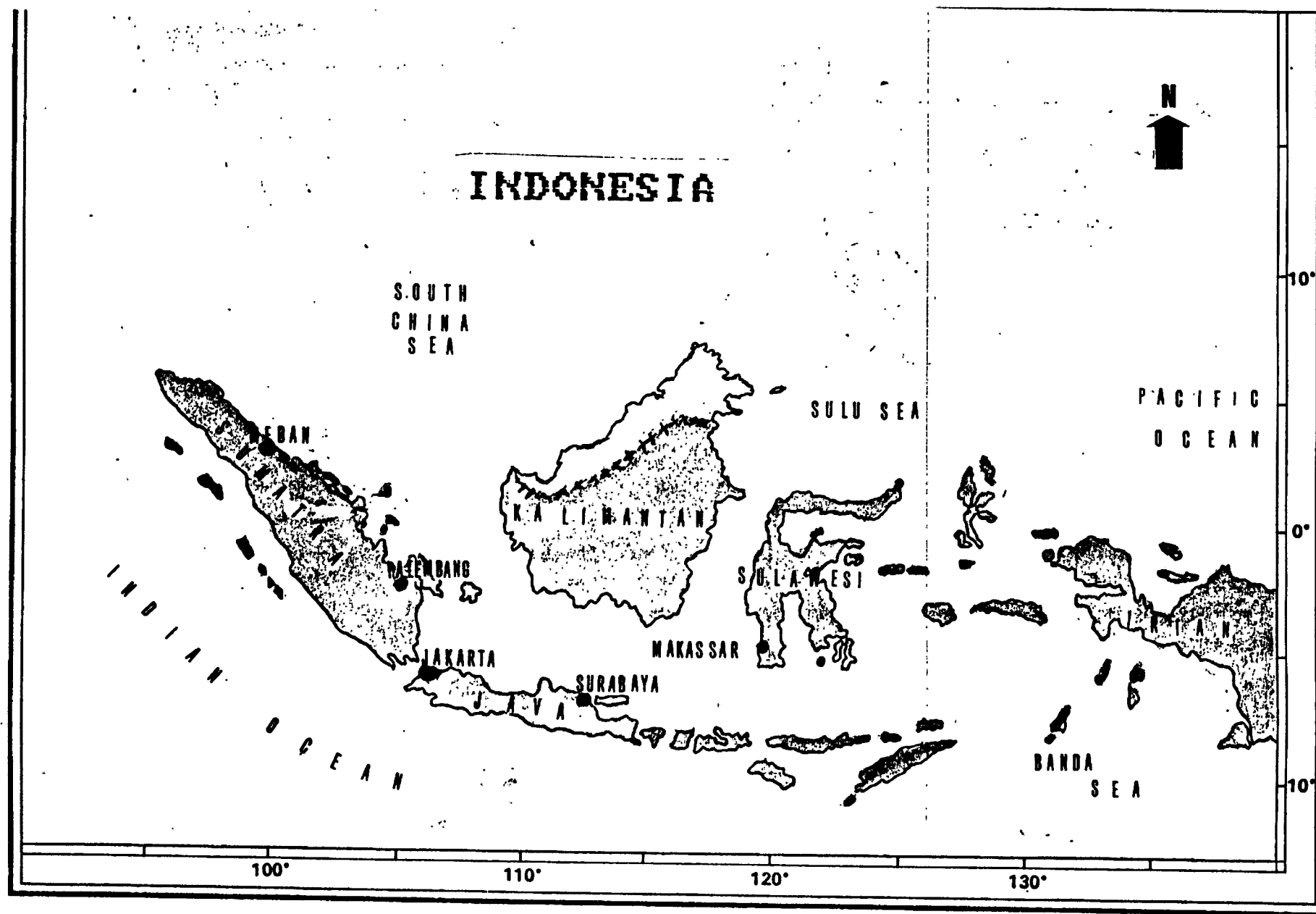
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## CHAPTER I

### INTRODUCTION

#### *A. GENERAL.*

The content of this project is based on personal studies and experiences. The purpose is to give a complete picture of the role of Sea transport including the port operations as part of a nations economic development. This material can also serve as one source among others for consideration by parties who are involved in trade and the shipping industry. It is not intended to teach professionals in the shipping industry, but each person should be more aware of how important the particular aspect fits into the proper pattern. I hope that this paper will have sufficient depth to be of interest and value to those professionally engaged in the shipping industry. As economic growth reaches the take off point in a large developing country such as Indonesia, which is an archipelagic and maritime country, there will be a rapid need for sea transportations as a dominant factor. To make it more clear, close to 85 percent of the total domestic goods is carried by sea transportations.

In some parts of the country, especially on the big islands such as Java and Sumatra, there is land transport, railways and roads, while in other parts, both land and sea transport are very limited and poor. In this case sea transport can play an important role; to generate the trade activities and as a means of communications as well.

## *B. REASON FOR CHOOSING THE TOPIC.*

The main reason to choose The Role of Sea Transport in the economic development as a topic is because Indonesia in general is an archipelagic state. Indonesia is a country which comprises some 13,700 islands, has land area of 735,354 square miles, and some 2,941,416 square miles of claimed sea territories. It is located between Asia and Australia, stretching 3,200 miles from east to west, and 1,100 miles from north to south. In a country like Indonesia, the economic growth is completely dependent upon sea transportations. The reasons for choosing The role of Sea transport in economic development in Indonesia as the focus of this project are outlined here:

1. Indonesia is the largest archipelagic country in the world.

2. Indonesia developed the concept of archipelagic principles which are found in the Part IV, Article 46 of the United Nations Convention on The Law of the Sea as follows: (\*)

" For the purpose of this convention:-

a) "Archipelagic state" means a state constituted wholly by one or more archipelagos and may include other islands;

b) "Archipelago" means a group of islands, including parts of islands, interconnecting waters and other natural features which are so closely interrelated that such islands, waters and other natural features form an intrinsic geographical, economic and

---

(\*) UN Convention on Law of the Sea Part IV, Article 46.

political entity, or which historically have been regarded as such.

3. Because of the archipelagic principles, maritime transport is for Indonesia something like what are railways and roads for other countries.
4. In some parts of Indonesia, sea transport is being developed to a certain national level which can promote trade activities. Development of trade activities support the economic growth, at local, regional and national levels.
5. In the other parts of Indonesia, which consists of a large number of small islands there is a total lack of sea transport facilities and land transport is minimal.  
Most of the ports are with shallow draft preventing the vessels to approach.  
Passangers and goods have to be ferried to and from the vessels by lighters. The efforts required are considerable, goods are often damaged and delays to the vessels are significant.
6. The area including Sulawesi, Nusa Tenggara, Maluku and West Irian is populated only by 7.6 percent of the total Indonesian population, compared with that in the West part which consists of Sumatra, Java and Kalimantan, with a high density population, approximately 92.4 % of the total Indonesian population.
7. Indonesia bordering with neighbouring countries; Thailand, in the Northwest, Malaysia, Singapore and Philippines in the North, Papua New Guinea in the

east and Australia in the south. Therefore, in order to secure the neighbouring country's influence to Indonesia, sea transport is needed to support the unity of the Nation and support the political stability.

Some advantages might be derived from good and smooth sea transport as follows:

1. As trade promotion.

As already mentioned, sea transport is the most essential and dominant factor in economic growth. Indonesia consists of thousands of islands spread all over the Indonesian waters, creating the need for seaborne transportation to be able to exchange local products of the many islands, with some favourable effects as listed below:

- a. Through such exchange local shortages and surpluses as well as the resulting differences in market prices can be reduced or abolished.
- b. A good system of inter-island shipping make it possible to develop inter-island trade to such an extent that imports from abroad can be reduced and foreign currencies saved.
- c. A good system of inter-island shipping is capable to reduce sea borne costs, which has a favourable effect on market prices, consumption, production, entailing a balanced dispersion of production and productive yields over the country.

## 2.As an exploration and exploitation means.

---

The activities in exploration and exploitation of sea and sea-bed resources as an economic activity are being developed nowadays in almost all parts of the world. The commodity which is available from sea and sea-bed activities such as: fishing, - mining, sea-grass shells and pearls, besides oil and gas, can be used as export commodities and could be beneficial to the country. Other than the economic values, these activities can also create and provide employment to the population.

## 3.As dispersion of population.

---

Another role of sea transport in this case is to support the dispersion of the Indonesian population, in order to gain the equalization of the country's population density and development.

## 4. As a unification of the nation.

---

With smooth sea transport the distances between islands become shorter and people get to know each other because they always move from one island to another. This aspect is the most essential factor to support the unification of the people among the population, and at the same time a means to support the unification of the nation as a whole.

## 5.To support the national defence.

---

The political stability of the nation is the most important factor in determining the economic growth



of national concerns. It is impossible to develop the economic growth of the country without political stability.

Maritime defence and security considerations are yet another factor in both the political and economic geography of Indonesian waters, as an archipelagic country.

Indonesia is one of the regional states, grouped into an Association of South east Asian Nations (ASEAN) faction and Indochinese nations are concerned with national security and economic development. Geographical position of Indonesia in certain circumstances make Indonesian waters interesting for other nation. (\*) In addition to the classical function of Navy defence of nation's territory against aggressors, Indonesia has a number of other defence and security related problem.

Piracy and smuggling are activities that most nations feel must be controlled. Indonesia not only has vast areas to patrol but has dissident elements in her population, many residing on islands of hundreds of kilometers from the central national core.

A major issue in maritime defence, is the optimum size and composition of a national Navy, but it means a financial burden to the government. In time of war, sea transport is of great importance to the support of military movement. Therefore, it is no doubt that sea transport provides a great deal of support to the national defence as a whole.

(\*). Maritime Policy in Southeast Asia; by George Kent and Mark J. Valencia; London 1985; page 23, 24.

## 6. Provides Employment.

-----

Sea transport itself is an employer, and therefore responsible for their employees. This aspect is very important. Development of sea transport give more jobs to the population, both for national and international. The new technology development requires less manpower, and there is a shift from labour-intensive to capital-intensive. In Indonesia there is more man-power than needed and a high percentage of unemployment. Others developing countries are also faced with the same problem. In order to cope with the employment problems for population the government should create more activities, either state-owned or private companies, - particularly in sea activities, ports and shipping. Every new activity means provides new employment to the people. It is obvious that if the new activities are adopted new technology both medium or high, will require skilled man-power, and therefore training and education is needed, especially for the international employment, more skilled and educated seafares are needed, in order to fulfil higher position in the international fierce competition. The training and education itself is an employer, at the same time more job opportunities for the population are being created.

### *C. LIMITATION OF SCOPE*

The areas that will be covered in this project is in particular the aspect of national shipping and port operations, in connection with the promotion of domestic and international trade, the role of sea transport on the spreading of population, create the employment and the political aspect as an economic development.

In conjunction with the above mentioned subject, first of all, we have to know how the current situation of the national shipping is, its capacity and its position to carry out the trade, and the current situation of the ports, the role of domestic shipping, dredging performances, and then the role of the ports in economic development, such as the port as a transport node, the influence of the ports on the socio-economic structure, various system of port operations and physical cargo handling.

Furthermore, to study what should be the demand of the domestic shipping and port operations in the future for Indonesian trade activities needed. To study what type of the ship will be needed which are fit with trade pattern, flows of trade and ports situations and then how should be the port organization and its performance. After that to identify the problems regarding shipping and regarding ports. At last, but not least, the conclusion of all these matters and suggestions.

#### *D. METHOD OF RESEARCH*

In collecting the data in order to describe and elaborate this project the writer was using the three methods as follows:

a. Studies from books, using the material from the University Library, magazines and brochures and material from handout which were given by the Lecturers.

b. Studies from the reports of the research which was done by various institutions, for example: NE-DECO (Netherland Economic Development Co-operation), IRBD, The World Bank, the MSDP (Maritime sector development programme), the ship research Institute of Norway, Ro/Ro conference in Gotenborg-in Sweden etc.

c. On the spot research in Directorate General of Sea Communications of Indonesia in Jakarta and experiences during eight years at the Port of Bitung (Northern of Celebes, east part of Indonesia), and from some experiences in other ports.

#### *D. THE STRUCTURE OF THE CONTENT*

In order to get the systematic and clear picture of the project, the content of this project has been divided into 5 (five) chapters which are summarized as follows:

Chapter I: The Introduction which describes the general idea, the reason for choosing the topic with a very brief discussion about the reasons, the limitation of the content, the method of research with an

explanation how to obtain the information and finally the summary of the contents.

Chapter II: Aspect of domestic shipping and port operations. In this chapter after the presentation of the present situation of domestic shipping and ports in Indonesia the role of the domestic shipping and the discussed.

Chapter III: This chapter is headed by Future Demand of Domestic Shipping and Port Operation. The content of this chapter is the discussion about the type of ships and how to choose which will be suitable for carrying out the sea transport in certain areas and continued with the traffic network. The continued discussion is about port organization and its performance.

Chapter IV: the content of this chapter is the identification of the problems regarding shipping, ships and ports.

Chapter V: The content of this chapter is the conclusion of the project, and based on that conclusion the writer puts his opinion as a suggestion / or recommendation.

## CHAPTER II

### *ASPECT OF NATIONAL SHIPPING AND PORT OPERATIONS.*

#### 2.1. Present situation of National shipping and port operations.

##### 2.1.1. Shipping. -----

Indonesian Government Regulation No. 2 of 1969 requires that domestic shipping is entirely carried out by the national flag carriers (cabotage). In international shipping the Government policy is to encourage a fairshare participation for national fleet. Permits are granted by the Indonesian Government to foreign flag carriers on specific conditions; the foreign flag needs to make use of an Indonesian operator for domestic trade and an Indonesian agent, who submits the tariffs, manifests and conference membership to the Minister of Communications for approval in foreign trade.

There are a lot of shipping companies in Indonesia, among them, there are two ocean going companies : P.T.Djakarta Lloyd and P.T. Bachtera Adhiguna and one inter-island company the Pelayaran Nusantara P.T.Pelni. These are state owned companies, but run as private companies as well. Private shipping companies licences are granted by the Indonesian Government.

a. *The national fleet capacity in 1984, in relation to domestic shipping to serve the domestic trade.*

Status	Number	Dwt
Regular liner fleet	361	425,428
Local fleet (up to 175 Grt)	1,090	161,476
Sailing (motorized) fleet	3,346	179,032
Pioneer vessels	35	23,179
Port assisting vessels	635	96,828
Special vessels (carrying homogeneous bulk )	2,310	1,979,169
Total	7,776	2,865,112

Although the total national fleet capacity in relation to domestic shipping to serve the domestic trade almost of three million tons, a foreign fleet still participates in carrying the Indonesian domestic trade.

In fact only 2.8 percent of the total domestic trade is carried out by foreign flags, indicating the extent of self sustenance. In order to carry out domestic trade, the domestic shipping is predominant.

It should be borne in mind that before the Indonesian Government issued the new regulations concerning the existing vessels and the purchase of newly built vessels in 1984, a major part of the Indonesian fleet are predominantly worn-out and or obsolete. According to this policy, the existing vessels aged 25 years old or more must be scrapped, and the scrapping must be carried out in domestic shipyards.

In addition to that, purchases of second-hand vessels from abroad were prohibited.

By the year 1985 the ordering of newly built conventional vessels up to the size 5,000 Grt, has to be directed to the domestic shipyard as for ships of 20,000 Grt by 1990 must be done through the domestic shipyards as well.

Meanwhile ordering larger and or specialized vessels, which the domestic shipyards are not able yet to build, can be done in foreign shipyards.

*b. National fleet capacity in International trade in 1984*

General:	Number	Dwt
Europe trade	15	180,567
Japan trade	25	229,344
USA / Canada trade	11	164,066
Taiwan trade	5	153,603
Middle East trade	5	74,045
.....		
sub-total	61	801,625
.....		
Special:		
Tankers(crude/product)	74	1,076,781
Timber and wood	96	781,050
Oters	7	227,754
.....		
sub-total	177	2,085,585
.....		
Grand total	238	2,887,210
.....		



Here, shipping requirements can not be met by the Indonesian fleet only. In liner trade, a gradual decline can be seen as against a modest rise in tramp trade, as illustrated below:

*Indonesian share in International shipping*

	Million tons.		% share of Ind.fleet.	
	1978	1981	1978	1981
Liner trade	5.6	9.1	40.4	37.5
Outsider/ tramp-				
per trade	6.5	8.5	16.0	22.4
.....				

The Indonesian fleet share in Tanker trade is still negligible and oil movements take place on a charter basis.

*International Trade:*

A declining tendency can be disclosed, due to a market fall of homogeneous cargo shipments in special bulk carriers ( x 1,000 tons ).

*International shipping*

	1978	1979	1980	1981
Liner trade :				
National:	2279	2195	2782	3422
Foreign :	3356	3625	4571	5697
Tramper trade:				
National :	1037	1812	2015	1916
Foreign :	5449	6464	7686	6619
	1978	1979	1980	1981

Special homo  
geneous bulk:

National:	8845	9439	5078	3111
Foreign :	14463	16642	9162	7551

Sub-total dry  
cargo in me-  
tric tons :

National :	12161	13446	9875	8449
Foreign :	23268	26731	21419	19867

Liquids (long-  
tons)

National	423	-	-	-
Foreign	73447	83737	70250	82571

Total trade both domestic and international, rose signifi-  
cantly as may be shown as follows:

1978	1979	1980	1981
------	------	------	------

Dry cargo (in 1000 tons):	52,658	56,565	54,959	58,552
Liquids (in long tons):	102,945	111,967	109,694	122,254

The data was taken only from 1978 to 1981 and seem to be out of date, but, of course, from these figures we can conclude that the national fleet cannot yet carry out all the requirements of domestic and international trade of Indonesia.

Using foreign shipping to carry out National trade, even if it is on a charter basis, it means that Indonesian is loosing foreign currency, which is needed by the country. Therefore, the role of national shipping is significant.

In the case of domestic shipping, the merchant fleet of Indonesia can be divided into three main groups, as follows:

1. Regular inter-islands service the "Pelayaran Nusantara lines" which serve the trade between the islands with size of ships from 500 Meter cubic up to 3,500 dwt. In this group there are 51 operators using ships of 397 units totalling 503,371 Dwt.
2. Regular local services, which are known as "Local shipping" or the "Pelayaran Lokal" consist of different types. The maximum size of ships is limited to 500 meters cubic and their range of operation is limited to 200 sea miles from their home port. There are approximately 178 operators with 720 ships, totalling 81,717 Grt, operating on 148 local routes.
3. Sailing vessels such as the so called "Perahu" covers locally built wooden vessels and are broken down as follows :
  - Pure sailing vessels,
  - Sailing vessels with auxiliary engines used in harbours mainly.
  - Motorized sailing vessels using sails only as an auxiliary,
  - Motorized wooden vessels not using any sail for propulsion.

In this group there are about 351 operators using more than 3,486 vessels totalling 180,447 Grt.

The figures are very approximate since the organization and financing of this group is still purely traditional.

The Indonesian Government, in this case is the Directorate General of Sea Communications, with decree No.DAL.13/2/5 on December 1983, put all ships in the inter-islands service group into net-work trayect, and with Decree No.DAL 13/2/6 on 22 December, 1983 also put all ships of Lokal services into a certain traffic net-work. The tables of those traffic net-works will be attached as annexes to this project.

### *2.1.2. Role of the Domestic Shipping with regard to Domestic trade*

As mentioned before, Indonesia consists of thousands of islands spread all over the Indonesian waters, the largest area covering the same distance as between Moskow and London. These big areas create the need for seaborne transportation, at least domestic shipping, to be able to exchange local products of the many islands.

There will be no trade nor the exchange of local products between islands without sea transportation.

The inadequacy of sea transportation, means hampered trade. It is obvious that domestic shipping is predominantly carrying out domestic trade.

Therefore, in order to be able to generate the National economic growth, the improvement of the sea transportation generally is prerequisites.

If we look at the present fleet capacity of the domestic shipping which is obliged to carry out all the domestic trade compared with the domestic trade volumes then in fact approximately 2.8 percent of the foreign flag still carries out the domestic trade.

According to a survey report by the MSDP team done in 1983, the domestic trade of Indonesia showed a marked increase.

The domestic trade can be divided into two main categories, e.g. dry cargo and liquid cargoes. The dry cargo category consists of break-bulk cargoes such as grain, rice, copra and cloves. Liquid cargoes consists mostly of the crude oil and oil products such as palm oil

and coconut oil. The M.S.D.P. research was done based on detecting and collecting data in a four years period as follow:(in 1000 tons):

	1978	1979	1980	1981
Dry cargo :	17,229	16,388	23,663	30,152
Liquid cargoes:	29,075	28,331	39,444	40,130

When we look at the above datas, it shows that the domestic trade decreased for 5 percent in 1979 if we compare with in 1978, but in 1980 there was an increase of 25 percent and also in 1981 increasing for 45 percent relatively.

Base on these data, the average increase rate on four years periode is 25 percent per Year.

It is also true that the domestic shipping play an important role in distributing the international trade reaching the main gate ports to the last point of destination, taking into consideration that there are no other means of domestic transportation.

Another function is to collect the export commodities from several ports of origin in the hinterland and to bring them to the port of export, which in this case are gateway ports.

Roughly speaking, domestic shipping is the important factor since the country intends to promote their export.

The main problem facing the country is the inadequate domestic shipping service in quantity and quality for

exporting the inter-island industries production, which are produced by hinterland industries, as they are the main transportation in order to bring them to the export ports, particularly in an archipelagic country such as Indonesia.

To spread economic development equally among all national regions a proper domestic shipping policy must be considered.

That is why in this project the writer tries to open up all of the aspects of the domestic shipping and port operations.

In an archipelagic country such as Indonesia, there is one thing, which one should never overlook as it is a very basic and fundamental method, that is how to organize the sea transport system in order to link all those islands regularly and reliably in the cheapest way.

This aspect is very important in order to obtain the objectives as mentioned earlier i.e. promote the domestic trade to be able to exchange local products of the various islands.

Direct effects or the advantages could be derived from the smooth sea transportations system already mentioned in the introduction to this project in chapter I.

As we know that most of the Indonesian ports, except gateway ports like Tanjung Priok, Surabaya, Belawan and Makassar and some of the medium ports, which are called collector ports by ILS (Inter-island Liner Service) team, are with shallow depth, lack of ports facilities and has poor

management and operation system.

Shallow depth in the ports prevent the ships to approach them. In a situation like that, usually cargoes and passengers which are loading /discharging to/from the ships have to be ferried with lighters.

This particular case creates difficulties to the ship services and port operations, resulting in a national interest, if we are not aware of the undesirable effect as described below:

1. Prolongation the port's time of the ships, which means increase the cost of operations (fuel, wages, port's dues etc)
2. The port have to prepare barges and tug-boats in order to serve the loading /discharging of the ships
3. Because of double manipulations of handling, the percentage of damage to the cargo is higher and port labourers ask for extra wages, because they work under special condition.
4. Prolonged time of loading and discharging, entailing delays to the ships and the shippers/consignees, who have to pay demurrage.
5. In turn, all of the costs will be an addition to the price of the commodity which is bought by the consumers.
6. Reluctance of the ships to call in certain ports



it is means that the area/island will lack transport means and sooner or later will be isolated from the trade activities etc.

7. When there is no sea transportation, the producer or the farmers in that area will stop to produce their commodity for export (out from that area to another area and island), and they will produce just enough for themselves only.

8. There are many other effects from this situation which will be as disadvantageous for the country but we hope that because of the smoothness of sea transportation, this will never happen.

In order to avoid the above undesired effect mentioned, in recent years, the Indonesian Government has established a "Pioneer Line", or "Pelayaran Perintis" is a non profit making service.

The main task of the Line is to link the islands which the profit making shipping companies are reluctant to serve. The Pioneer Line has been as a big burden to the Government with a lot of expenditures.

Eventhough, the purpose of the Pioneer Liner was not maintained because the same problems were faced by some of the Pioneer vessels, furthermore, the ports lack of facilities and have poor management and inefficient cargo handling system.

So, what we intend to discuss in this project is how to

solve such problems, and to give a clear picture of sea transportation which has a very important role, since sea transportation is a dominant factor, particularly in an archipelagic country.

## *2.2. Present situation of the ports in Indonesia*

Indonesian Government Regulation No.1, of 1969, puts all of the Indonesian ports in the hands of the Central Government, since they are considered as a vital part of the Indonesian economy. Having all ports under one control, a central port policy can be executed with a controlled investment program in order to ensure full utilization of port facilities to the benefit of the nation.

Total ports of Indonesia are approximately 260.

Ports divided in four groups:

- dependent ports,
- self supporting ports,
- autonomous ports and
- special/industries ports.

The Indonesian Government provides the facilities; i.e. a sufficiently deep maritime access channel, port basin, quays and jetties, deepsea godowns and open storage areas, bunker facilities, pilotage and tug assistance and net road system for the proper conveyance of goods and passengers in the port area.

The interest of the ports, belonging to one maritime district are coordinated by the head of that district, who

acts as the representative of the Director General of Sea Communications. The Indonesian territory is divided into nine districts.

Implementation of the port regulations and port rates are controlled by the Head of the District concerned, while the port regulations and port rates are prescribed by the Central Government.

The actual loading/discharge of seaborne vessels as well as all cargo handling in the port, is left to private enterprise as terminal operators and at the same time as an agent and or stevedores, unless certain activities are deemed to be better executed by the port administrator, so called Unit Terminals.

A good example is the Unit terminal for container handling in the port of Tanjung Priok, where one single specialized terminal could operate more effectively than in the case where every terminal operator would handle its own limited container cargoes with specialized facilities.

The provision of port facilities is done through the Port Administration who look after their proper use.

Where needed, cargo handling equipment is also provided by the Port Administration.

It is difficult to express the total Indonesian ports capacity in one single figure, since the water depth in front of the quays varies greatly, whereas deepsea godowns from port to port have various floor (carrying) capacities.

In general terms, however, it can be stated that cargo movements in Indonesian ports have been increasing for more than the port capacities, either expressed in floor

space or quay length, resulting into a marked increase of the intensity of utilization of port facilities.

The port of Tanjung Priok, Surabaya and Belawan have been through rehabilitation-upgraded to a high extent. The port of Makassar, has only been rehabilitated to a limited extent, due to loss of trade and declining port revenues.

The many other hundreds of ports spread over the Indonesian archipelago have-at best-only been upgraded in a limited sense.

Indonesian ports, again with the exception of Tanjung Priok today, still bear the characteristics of traditional ports, not fully capable of handling cargoes of modern physical appearances

Cargo handling methods are still labour - intensive. Tools and cargo handling equipment are of general nature, whereas the many physical appearances of modern cargoes require different tools for different purposes. Direct loading/discharging from vessels on truck and vis a vis frequently occurs to minimize cargo handling costs. The limited port capacities necessitate prolonged working times, and round-the-clock-working is regular in busy port like Tanjung Priok, Surabaya and Belawan.

In the last three ports, port throughput figures are significantly high, while in other ports particularly in the east part, the situation is the opposite, throughput figures are very low because lack of facilities.

### *2.3. Dredging performances*

Most of the Indonesian ports suffer from a need for permanent dredging work all round the year.

In order to keep their depths, convenient for berthing the vessels alongside the quay, need of being dredged to an amount of almost 40 million cubic metres per annum in recent years. In the past decade, the dredging fleet did not succeed in meeting the dredging needs, in the past few years the actual dredging production decreased to an amount of approximately 5 million cubic metres per annum.

Due to funds of the "National Five Year Planning" I, II and III, a dredging fleet of an important capacity has been materialized.

Management of sophisticated dredging fleet, however, requires special skills to operate the intricate machinery on the one hand, and the ability to utilize its capacity effectively on the other.

The problem is presented by the increasing age of the dredging fleet requiring a corresponding increase of maintenance/repairing which has an unfavourable effect on the actual production.

The current dredging fleet and a considerable part of the available dredging fleet already requires instant replacement, as specified below:

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*Current dredging fleet. To be scrapped instantly.*

.....

<i>11 Hopper dredgers of 21,000 cubic-metres</i>	<i>4</i>
<i>8 Bucket dredgers</i>	<i>5</i>
<i>7 Cutter dredgers</i>	<i>4</i>
<i>7 Clamshell dredgers</i>	<i>3</i>

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*Source: Maritime Sector Development Programme.*

The actual dredging requirements for maintenance are still being well below 10 million cubic metres in first half of the seventies, rapidly increased to 22 million cubic metres in the early eighties, due to the constant rise of sea-going vessels' draft.

Dredging needs, however are expected to further rise in the next six years to a level of approximately 46 million cubic metres due to increasing ship's sizes (tankers, bulk carriers, container vessels) and a corresponding draught increase, even if it is not sufficient for the dredging needs to maintain the draught of the smaller ports which may need between 5 to 6 million cubic metres per year.

These circumstances will inevitably cause significant purchases of dredging equipments in the remaining eighties, in order to readily be able to cope with the increase of dredging requirements.

The dry dock and or floating docks are available.

According to the standard cost of dredging from the National Development Planning Agency of Indonesia it is estimated that the cost is Rp.500 (rupiah is Indonesian

currency), per cubic metres, ( US Dollar 1 = Rp 1,000,-).

In the matter of fact, from the above datas, the conclusion can be drawn as follows:

- a. In the next few years most of the dredging fleet should be renewed, which means that it will need a great deal of money.
- b. Every year Indonesia should spend some 25 million of dollars, only for dredging needs and this will increase year after year.
- c. Special skilled personnel are required to operate the new development of the dredging fleet.

Table 1

## CAPACITY AND LOCATION OF THE INDONESIAN DREDGING FLEET

TYPE AND NAME	COUNTRY OF BUILD	YEAR OF BUILD	ANNUAL CAPACITY IN CUB. M.	LOCATION
<b>UPPER SUCTION DRED.</b>				
Ilmantan (750 M3)	Netherlands	1949	345.000	BPP Tg. Priok
adura (250 M3)	Netherlands	1950	115.200	BPP Semarang
matara II(3000	Germany	1956	1.382.400	BPP Tg. Perak
ru (750 M3)	Germany	1961	742.500	BPP Tg. Priok
mbok (750 M3)	J a p a n	1975	1.350.000	BPP Tg. Priok
lawesi II(2900M3)	Netherlands	1975	5.220.000	BPP. Belawan
mbawa (1000M3)	J a p a n	1978	1.800.000	BPP Tg. Priok
awa (2900M3)	Netherlands	1978	5.220.000	BPP Tg. Perak
imor (2000M3)	J a p a n	1980	3.600.000	BPP Tg. Priok
eram (3000M3)	Netherlands	1980	5.400.000	BPP Tg. Perak
ian Jaya (4000M3)	Germany	1981	7.200.000	BPP Belawan
ores (2000M3)	J a p a n	1982	3.600.000	BPP Banjarmasin
anda (1000M3)	Netherlands	1982	1.800.000	BPP Semarang
<b>CKET DREDGER</b>				
romi ( 40 L )	Netherlands	1916	32.000	BPP Semarang
ono (700 L )	Germany	1951	307.200	BPP Belawan
maru II (380 L )	Germany	1955	-179.200	BPP Tg. Priok
lando (380. L )	Germany	1957	204.800	BPP Tg. Perak
rempaka (120 L )	Germany	1957	96.000	BPP Semarang
nggallang (700 L )	Germany	1964	633.600	BPP Tg. Perak
ung (700 L )	Germany	1980	1.000.000	BPP Belawan
njani (700 L )	Germany	1980	1.000.000	BPP Tg. Priok
<b>TEER SUCTION DRED.</b>				
tanghari 8"	U S A	1951	64.000	BPP Semarang
hakam 8"	U S A	1951	64.000	BPP Manado
antas 12"	U S A	1952	112.000	BPP Tg. Priok
si 22 " (*)	U S A	1952	1.152.000	BPP Tg. Priok
hakam 24"	U S A	1976	2.160.000	BPP Samarinda
si 30" (*)	U S A	1977	4.200.000	BPP Tg. Priok
pues 30" (*)	U S A	1977	4.200.000	BPP Tg. Priok
<b>AMESHELL GRAB DRED.</b>				
ricn III/I(4 CYD)	U S A	1955	192.000	BPP Tg. Perak
ricn III/II(4CYD)	U S A	1955	179.200	BPP Belawan
ricn 93M(2,5CYD)	U S A	1955	96.000	BPP Tg. Priok
ricn 93/II(3,5CYD)	Singapore	1976	150.000	BPP Tg. Priok
adano (2,5 CYD)	Indonesia	1979	180.000	BPP Tg. Perak
ngkarak (7 CYD)	Indonesia	1981	400.000	BPP Tg. Priok
o b a (7 CYD)	Indonesia	1981	400.000	BPP Semarang
<b>T O T A L</b>			54.777.100	



MAINTENANCE DREDGING ESTIMATED QUANTITIES X 1000 M3

LOCATION	1984/85	1985/86	1986/87	1987/88	1988/89
jung Priok	650	650	650	650	650
da Kelapa	300	300	300	300	300
ebon	600	650	650	650	650
embang	5.000	5.000	5.000	5.000	5.000
gkal Balam	300	--	300	--	300
m b i	3.000	2.500	3.000	3.000	3.000
tianak	2.000	2.000	2.000	2.000	2.000
tok	-	150	-	150	-
gkulu	1.100	1.100	1.100	1.100	1.100
uk Bayur	300	-	-	-	300
jang	-	200	-	200	--
apang	-	750	-	750	-
arang	2.500	2.500	3.150	3.150	3.150
g a l	150	150	150	150	150
acap	300	-	300	-	300
abaya	3.500	3.500	3.500	4.000	4.000
sik	100	100	100	100	100
xolinggo	100	100	100	100	100
ruan	300	300	300	300	300
n o a	200	-	200	-	200
ar	200	-	-	300	-
ni	100	-	100	-	100
wan	4.500	4.500	5.650	5.650	5.650
ng Raya	-	100	-	100	100
: Seumawe	200	-	200	-	200
a Langsa	1.000	1.000	1.000	1.000	1.000
ajamasin	5.500	5.500	6.000	6.000	6.000
ng Pisau	1.500	1.500	1.500	1.500	1.500
urinda	2.500	2.500	3.000	3.000	3.000
xit	500	500	750	750	750
syap	3.000	3.000	3.000	3.000	3.000
ung Redep	3.000	3.000	3.000	3.000	3.000
T O T A L	39.250	42.550	45.000	45.900	45.900

### 2.3. THE ROLE OF THE PORTS IN ECONOMIC DEVELOPMENT

The port plays a significant role in economic development in Indonesia. The port is as a gateway of the interchange of commodities between islands and also for imports-exports of cargoes.

Mr.B.Nagorski,in his book;Port Problems in Developing Countries,mentioned as follows:

*" In advanced countries,ports are,of course,also playing and essential role in economic development"*

(\*).

From this statement we know that ports in every country, developed and or developing country are playing and essential role in economic development for the country concerned The Port of Rotterdam for example,provides a considerable remuneration to the economy of the Netherlands (as we knew from the Financial Manager of the port of Rotterdam,during my on the job training in that port,for two months.)

I belive that the port has an indication of direct influence or impact on national socio-economic structure,- particularly to the country which consists of many islands,because sea transport will be the only means of the transportation.

Mr.J.Bathurs in his book;The role of the port in economic development,explains,how the port can play it role and has an indication of direct influence or impact on national socio-economic structure and its converse aspect,the influence of the economic development,trading and marine,land transport patterns on the port.

(\*) Port problems in Developing Countries:by B.Nagorski.

### *2.3.1. The port as transport node (\*)*

A transport system consists of Node, (ports, towns, villages), link (railroads, highways, air routes, inland waterways, marine routes), and flows (movements of vehicles on these routes with cargo and people).

The port is particularly an important node since it lies at the interface between the sea link and the land link, at the point where enormous flows of goods or people are transferred from marine vehicles and broken down into smaller flows for distribution by land vehicles and vice versa, the port is thus a critical subsystem within the total transport system.

The objective of the total transport system is to minimize the real cost of moving materials.

To achieve this aim, it may be necessary to sub-optimize each of the sub-systems. We know, for example, that generally speaking, as ships increase in size the cost per ton of goods transported by sea decreases.

On the other hand, the cost of ship's time in port increases unless matching port capacity is provided.

Thus if the ship is held in port due to inadequate port facilities, total transport costs start to rise.

However, if the port attempts to provide all the capacity required for the biggest vessel, the port and cargo handling cost may, as result of port investment, begin to increase more rapidly than the cost of ships time which is decreased as a result of the port investments.

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\*) The Role of the Port in economic development: J. Bathurst

In this case, there will probably be an optimum point in the total cost curve between ships time and port cost which represents the capacity which the port should provide. It also follows that in some trades, while further economies of scale can be obtained from larger ships it would require increasing port handling by up to perhaps as much as 50 % to maintain turnaround times. (\*)

In such a case it may be more sensible not to increase the size of a ship. The same reasoning applies to the land subsystem; the port can go on providing facilities for the accommodation and turnaround of land vehicles providing that the cost of land transport link is decreasing more than the cost of providing port facilities is increasing. An appreciation of the relationship between various costs in total transport system can therefore be a guide to the timing and amount of port investment.

It is also important in the total transport system to identify where bottlenecks and the highest costs are incurred.

In a study carried out in Indonesia, for example, one ton of a commodity was traced through the total transport system from the warehouse in the overseas point of origin to a village store in the port hinterland. It was found, that the greatest costs and hence addition to the price of the commodity, were incurred over the relatively short distance between the port of discharge and the selling point in the hinterland. (\*\*).

The explanation of the above mentioned is because the goods can not be discharged directly to the nearest port

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\*, \*\*, The role of port in economic development: page: 36.

of the selling point, but have to be discharged in the import port (gateway ports) and then transhipped to the smaller port, nearest to the selling point or consumer market.

Then again that the ships which carry the transshipment goods can not berth and accomodate at the small port because of its shallow depths, the goods has to be feeried to the port from the anchorage ship. Quite clearly, in such a case the handling cost of the goods increases much more, and hence is added to the price of commodity per unit.

Any improvement in the sea transportation, particularly in domestic shipping and in the port of inter-islands, will lead to a decrease in the real cost of the commodities. Indeed, any improvement in port of discharge, leading to an increased rate of delivery to the land transport sector, is the reason why the improvement of sea transportations will not gain much decrease of transport cost without being followed by the improvement of the land transportations.

The cost of hinterland transport may be further illustrated from the report on the "Maritime Transportation Of Natural Rubber" Published by UNCTAD.

In this report it was shown that the small holders in the hinterland of Indonesian ports received only 40 to 50 % of the FOB price of their export commodity, the rest was taken up by marketting and transport cost. (\*)

Of course this is not to argue that all attention should be switched from achieving reductions in sea transportations freight rates, or from investing in port improve-

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\*) Maritime Transportation of natural rubber: UNCTAD 1984

ments, but simply to make the point that it is necessary for the Port Authority to take an overview of the total transport system to identify bottlenecks.

From such an analysis port planners will be in a better position to phase port development and delivery to the land link, to advise and advocate improvements in particular modes of inter-islands and hinterland transport, the adoption of new technology such as palletization or containerization, the advantages of processing or semi-processing exports at points of collection, or the development of some new forms inter-islands and hinterland distribution and collection.

In carrying out a total transport analysis a port should of course attempt to identify the extent and characteristics of its hinterland.(\*).

But in many instances it is difficult for a port authority to demarcate its hinterland for a wide range of commodities. However, if obtainable, this information can be very valuable, because it will enable the port to more accurately assess its nodal function in the regional and national transport system, and allow more accurate forecasts to be made of the likely increase or decreases in the flow and types of cargo to and from the ports.

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(\*) Port Development, a Handbook for Planner in Developing Countries: Second edition by UNCTAD N.Y. 1985, Referring to Chapter II, para : 99, 100, 101 and 102. Another important aspect of the nodal function of a port is that

not only does it provides the transfer facility for the sea or ocean-going vessels of a large capacity and the land or inland waterways vehicles of much smaller capacity but it is also the transfer point where two work time systems become involved.

A ship at sea is steaming for 24 hours a day in 7 days a week.

The normal working hours on shore vary from port to port, but as a typical example let us say 8 hours a day for 5.5 days, or even only 5 days a week.

Yet another aspect of the nodal function is that very often, it is at the port where change of economic and commercial system take place, depending on terms of shipment and other related factors, the port is the point where goods entering or leaving a country are more often than not subject to customs formalities, payment of duties and taxes, a change of ownership, and sometimes even quality control inspection.

Thus although the nodal points in the transport chain are of importance, within itself, a most complex sub-system of many inter-acting activities.

#### *2.4.2 The influence of the port on the socio-economic structure*

This largely revolves around what might be termed the capacity of the port, with the word capacity being used in its broadest sense. One very often thinks of a port as being the area within the officially designated port limits, i.e. on the landward side, the area within the port perimeter and on the seaward side, the area within the laid down port limits including all wharves, piers, anchorages, sheds etc.

While this area within the officially designated port limits provides what is essentially the heart, or hard core of port activities, the immediate surrounding areas and the port related activities conducted there in are also of great significance, as the port itself generates the need for these.

There are so many differing circumstances and parameters involved that it is very difficult to generalize. Depending on the very many inter-acting factors within each port together with its seaward and landward links it creates of itself the need for what might be termed supportive or ancillary activities.

For ease of reference it is felt that perhaps the introduction of a new term of reference might be applicable, i.e., "Maritime transport" and this collective terminology must be included all of the above transport links and their supportive activities. (\*)

In order to analyse this situation which becomes of considerable importance, when realizing the role, function

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\*) . The Role of the Port; by J.BATHURST; page: 38.



and impact of port to the national socio-economic sense as well as to the planning of port activities, facilities and capacities, it is necessary to review and study the problem in its entirety. To bring this topic to its basic fundamental it needs to be studied under certain headings. In fact, without including side issues related to the creation of the infrastructure such as civil engineering side, which in itself can be extremely diverse and considerable we can end up with a basic list of ten major activities, which are outlined and discussed further in this project. (\*)

The foregoing has tended to accent the influence or impact that the port can have on the national socio-economic structure. It has shown how the many port related activities are self generative and do in fact provide a considerable input to the economy.

The best solution is that provided the port is functioning effectively and it does not become a bottleneck to the trading and commercial activities of the country through congestion, caused either by lack of facilities and capacity or poor administration and organization. When this occurs, the port instead of being a contributor to the economy, becomes a severe drain. Trade flows are restricted, surcharges are imposed and so on; all of which in turn have an adverse effect on the ability to earn foreign exchange and add to a spiraling cost of living.

The ten major activities in the port which are interrelated to each other and has a strong influences on the

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\*) .Port infrastructures, Lecture paper by Prof. Georgandopoulos.

success of the port are listed and discussed as follows:

- 1.Cargo handling,
- 2.Shipping operation,
- 3.Warehousing,
- 4.Lighterage,
- 5.Transpotation,
- 6.Ship supplies,
- 7.Bunkering,
- 8.Ship agency and Freight forwarding,
- 9.Banking and Insurance,
- 10.Shipbuilding and Shiprepairing.

It is necessary to examine each in turn and therefore we will discussed one by one biefly.

#### 1.Cargo handling.

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This activity covers the handling and movement of cargo from the ship's hold to the point of rest within the port area or on board the lighter and vice versa.The activities break down into four main sub-sections,namely; a.Container and unitized cargoes;if any. b.Break-bulk cargoes, c.Dry bulk cargoes, d.Liquid bulk cargoes.

#### 2.Shipping operation.

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This activity includes any business relating to the operation of ships,including ownership,charactering and brokerage,which has an economic influence on the coun-try.

### 3. Warehousing.

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This activities breaks down into four main sub-sections which can be within and without the port area as follows:

- a. Transit sheds,
- b. Warehouses (leased and owned-for longer term, storage purposes).
- c. Open storage areas,
- d. Container freight stations.

### 4. Lighterage.

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This activity covers lighterage operations from point of loading to point of unloading and it too breaks down into three main sub-sections, namely;

- a. Roads to inland waterway systems and reverse,
- b. Roads to port areas and reverse,
- c. Ship to ship direct and including interim storage on lighters.

### 5. Transportation.

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This activity covers the transportation activities, principally trucking, road and rail haulage, from the port area or point of loading to the consignees' premises and vice versa. It breaks down into two main sub-sections, namely;

- a. Containers or unitized loads as units, or
- b. Break bulk cargoes.

#### 6.Ship supplies.

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This activity includes all aspects of supplies and provisions to ships, including ship stores, deck and engine stores and spares, catering supplies, etc.

#### 7.Bunkering.

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There are two principal aspects to this activity, namely,

- a. Ships that visit the port especially to bunker, and
- b. Ships that visit to work cargo but which also take bunkers at the same time.

#### 8.Ship agency and Freight forwarding

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This activity covers all activities required in the agency and forwarding business in support of the overall shipping activities.

#### 9.Banking and Insurance.(\*)

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This activity covers all financial aspects of the shipping industry, including financing, leasing, day to day transactions relating to bills of lading, letters of credit and other banking facilities provided to the shipping activities. It also embraces the activities in the insurance field insofar as they relate to all aspects of marine and cargo insurance, including that on support facilities for operating and servicing the shipping activities.

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\*) .Reference:Lectures;Letters of Credit by C.Moreno,WMU

Note should be taken that there is an element of self insurance in certain areas of these activities.

#### 10. Ship building and Ship repairing

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This category covers a fairly wide range of interrelated activities, the principal of which can be summarized as follows:

- a. Shipbuilding (ocean and coastal vessels)
- b. Shipbuilding (small craft and auxiliary vessels)
- c. Repair work to ships, small craft and auxiliary vessels (including docking for surveys, etc)
- d. Repair and maintenance work relating to mechanical handling equipment for cargo and containers.

It should be noted in addition to the above mentioned ten main activities that there are other numerous support and ancillary services which form an integral part of all shipping activities.

They include such items as pilotage, establishment, operation and maintenance of navigational aids both visual and electronic; communication system; fire fighting; police services; towage and salvage; etc.

From the above list, it will be noted that all of them are activities which are interrelated within the overall maritime transport situation in the country and therefore, while they each contribute to this situation, they are in turn, to greater or lesser degree, depending on the overall scope and orientation of it for their own existence.

Each activity is therefore both contributory to, and reactive to, this overall shipping situation.

Thus it can perhaps be considered a reasonable assumption that even though each activity will have certain factors or reasons affecting it which are peculiar to itself, each will also be influenced by a set of common reasons and factors which arise from this overall situation.

With the foregoing in mind therefore and to provide an appropriate background for the examination of each activity in detail, it is advisable to outline what are considered to be the factors which can affect the overall scope.

## *2.5. VARIOUS SYSTEMS OF PORT OPERATIONS*

As we know from the lectures and from the Port Operations Seminar in Le Havre last November 1985, that port operations can be done in various systems. Ports in France are mostly autonomous, while in England the Port Authority is as private company.\*

In Scandinavian countries and in the Netherlands as well, operational of the ports rest on the Municipal authorities while in Poland and socialist countries, all ports are operated directly by the Government.

Ports in Indonesia are operated according to two systems, some ports are operated in commercial bases while some ports, especially the smaller ports are operated as public ports.

According to the Government Decree No.11/1984, most of the Indonesian ports are operated as State owned enterprises.

Services to be rendered to ships and to cargo are very similar in all commercial ports.

But there is a great variety of systems by which port operations can be organized. Ship berths can be operated by the port administration as public terminals, open to vessels of any shipping lines, but they can also be rented to individual lines or other private interests for their exclusive use.

Physical handling of cargo can be performed either by private contractors or the port's labour force. Roughly speaking, there are two main tendencies in the organization of port operations. One is that of concen-

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\*.Port operation Seminar, Le Havre, November 1985.

trating as many activities as possible in the hands of the port administration such as towage, lighterage, stevedoring, handling of cargo on land, bunkering, ships' repairs etc. Under this system, the port administration becomes not only a public body for administration, maintenance and extension of the port but also a commercial enterprise performing functions which, in other fields of economic activity, are usually performed by private firms.

The opposite and more frequently applied system is to restrict responsibilities of the port administration in the field of port operations to administrative activities and to the role of co-ordinator and supervisor. Activities of predominantly commercial character, as cargo handling, are left to private enterprises under an overall control of the port administration.

In countries with a fully state-controlled economy, private contractors are replaced by state owned firms, separate from the port administration and organized on a commercial basis.

Concentration of many functions in the hands of port management offers the advantage of unified command and easier planning of the activities. However, a public trust is usually less qualified than a purely commercial organization to perform certain kinds of services. The best policy is to disregard general theories or principles and to select for each field of port activities a form; public or private; which appears to give the best practical results.

Two specific problems of port organization are of a particular importance for the efficiency of operations,-



namely: Management of port terminals and physical handling of cargo.

The efficiency and the economy of port operations require that each existing berth be used to its full capacity, with a minimum of interruptions and of idle days.

It is obvious that chances for continuous occupation of a general cargo berth will be better if it can be allocated to any vessel that is ready to begin unloading imports or receiving export cargoes, and not exclusively to allocate berths to particular shipping companies.

On the other hand, it is very convenient for a large shipping line to have a permanent place of work, a berth where vessels can always be handled, where export cargoes can be assembled in advance and the routine of daily operations which can be easily established.

The possibility of such an arrangement depends on the frequency of calls made by the line at the given port and on the number of berths available in proportion to the port traffic.

If frequency of calls is high enough to provide for a quasi permanent occupation of berth by vessels of the line, a lease of berth to the line can be taken into consideration, provided it can be arranged without prejudice to the interests of the lines.

Situations must be avoided in which certain vessels can be immediately be accommodated at a leased berth while others have to wait in line for lack of space. If the number of berths is above the normal demand, difficulties of that kind may seldom arise. "Both conditions, high frequency of calls and a great number of berths, are fulfilled in some of the biggest ports of the world, as in Rotterdam, where the practice of leasing general cargo

berths to shipping lines or to terminal operators is a rule rather than exception.

Very often in Rotterdam, along term concession is granted to private firm for the use of a sector of the waterfront where some shore installations are to be built by the tenant at his own cost, according to plans approved by the port administration. (\*)

In big ports in Indonesia, such as Tanjung Priok, Surabaya Belawan, Palembang and Makassar, such a system is applied as well.

But in other smaller ports, all berths are operated as public berth, it means that the berth can be occupied by any vessels from any shipping line.

The berth occupancy system is "first come first served", in term that the ship should be in working-loading or unloading. This system adopted by port administration in order to obtain the efficiency of utilization of berth, and other quays facilities. In mostly developing countries included Indonesia, there is a wide spread shortage of general cargo facilities and they must be used as intensively as possible. Under such conditions the only reasonable way of operating general cargo berths is to keep them open to vessels of any line, in accordance with the daily requirements of the traffic. Interest of individual line can be met in part by allocating to its vessels always the same berth, without any formal commitment, and without reserving the berth for its exclusive use. Port management should retain full freedom of allocating berths on daily basis with the

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(\*). Port of Rotterdam; Lectures by Eng. C.B. KRUCK, Head of Technical Assistance Dept. of Port of Rotterdam.

aim of obtaining for all port users best overall results, without favouritism or discrimination. On the first sight it appears to be a simple task, the time of vessels arrival is generally accepted as the basis for deciding which ship is to be berthed first, in accordance with the old slogan "first come, first serve". In practice, it is a far more complicated operation.

Various conditions must be met to achieve a smooth handling of the vessel at a particular berth.

The depth of water and available length of quay must be suitable for the draft and the size of the ship.

Mechanical equipment must be at hand for unloading heavy loads. Enough space must be available in transit sheds for receiving inward cargo. Limitations such as these may easily preclude allocation of a berth that become free to the vessel which is first in the waiting line. Moreover, certain priorities are to be taken into consideration, either natural and fully justified, or rather artificial as it some time happen. Vessels carrying perishable goods must be unloaded promptly if there is a danger of deterioration of the cargo. Badly needed supplies and relief articles must be accorded priority over other ships in case of natural disasters or of impending famine or an exceptional shortage of certain foods and essential consumer goods in the country.

Must less justified is the priority accorded in some ports to all shipments addressed to Governmental agencies, regardless of their nature or degree of urgency. Military consignments have to be unloaded ahead of other cargoes in times of political emergencies or outright armed hostilities, but it would be a mistake to grant them permanent priority in time of peace.

In no even should priority be accorded to vessels under flag of some friendly nations, not even to ships of national registry. Flag discrimination is a most unpopular measure within the shipping community and serious source of tension between countries with the resulting danger of retaliatory economic measures.

As a general rule, all priority rights should be applied with great care, and only if there is a real need for bypassing the normal order of berth allocation in accordance with the arrival date of vessels.

Waiting time artificially imposed on regular general cargo liners is particularly harmful as it may lead to increase freight rates or to discouraging the line from including the port in the regular schedule of calls irrespective of the amount of cargo in each voyage. Deviations from the "first come, first serve" rule should be reduce to an unavoidable minimum.

The above system or recommendations and rules are intended only for vessels carrying break-bulk general cargo. Finally, waiting lines of vessels are highly undesirable occurrence in any port.

In normal times, vessels should be berthed as soon as entry formalities have been completed.

Waiting should be limited to periods of exceptionally high peaks of traffic, and even then, waiting time should be as short as possible.

Recurent and prolonged waiting is a clear sign that the port is in urgent need of rejuvenation, either through improvement of procedures or through extension of port facilities, or both.

A simple way of reducing waiting time of general cargo vessels is by unloading a part of cargo on lighters at anchorage grounds.

In convenience of double handling can be aply compensated by savings due to the reduction of vessel's time in port.

The ship should not lose her order of priority and should be moved to the first available berth, in accordance with the established procedure.

## *2.6. PHYSICAL CARGO HANDLING*

"The loading and unloading of ships have long been a severe bottleneck for seaborne trade" (\*)

According to the above statement, cargo handling became one of the problems in organizing port operations in deciding wheather the physical cargo handling is to be performed by Port Administration or by the independent stevedoring company as a contractor. This problem became very important because the entire success of the port may depend on the efficiency and speed with which cargo is handled in the ship's hold, when unload from ship to shore, moved from the wharf to a temporary storage space and delivered from storage to the truck/railways.

"Introduction of improved handling methods, selection of mechanical equipment, training of labours are very serious responsibility, not only of the organization

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(\*). Port Economics: by Jan Owen Jansson and Dan Shneerson, Published by The M.I.T.Press Cambrige 1982.

which incharge of cargo handling, but also, in a still higher degree of the port management" (\*).

In different countries the system will be different but, in Indonesia, in order to cope with such of problem, cargo handling is left to the independent stevedoring company.

With that system the smoothness and safety of cargo handling will be obtained, because the stevedoring companies will compete each other, and try to provide the best services.

On the other hand, if cargo handling is performed by the port administration, there will be no competition, and usually the port administration is always bureauoratic and it is not as free from certain rules and regulations as an independent cargo handling contractor.

A stevedoring company as private firms, has a wider range of freedom in selecting personnel, in promoting the most able employees, dismissing unsuitable help, or in negotiating special arrangements with clients.

But, in order to keep healthy competition, particularly regarding tariff,than tariffs for various services should be approved by the port administration as a representative of the government.

The numbers of cargo handling contractors, should be determined according to the extent of the flow of ships and flow of the cargoes in a certain port. In big ports they should be more contractors than in smaller ones.

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(\*).Port Operations I: by B.Nagorski; Published by International Association of Ports and Harbours 1972,Tokyo.

Provement of working performance and working capability should be as one of the determinatiing factors when giving the licence for work to the cargo handling contractor.

Control over efficiency of operations can be strengthened by establishing a system of licences for work within the port area and by granting licences only to organization or stevedoring company of proved ability. Every stevedoring company has to have an expert in cargo handling, stowage plan etc, in order to guarantee the safety of the work.

With regaed to the cargo handling activities, there are three major factors which should be determined as the most important,as follows:

1. Cargoes should be handled properly,with care smoothly and safely.
2. Safety requirements for the life of people in charge of the works should be one of the most important factors.
3. Cargoes which are handled in proper way, stowed and transfarred, both in the holds of the ship and on the shore storage places(- sheds,openstorage,etc) should be safed and protected against damage and loss.

In order to guarantee the safety matters of the work, it is needed to be supervised by the supervisor from the port administration. For the stevedoring contractors which are not applying the safety regulations and are

working below the standard speed, should be penalized.  
With the restrictive rules and regulations and proper  
control of work, the performance of the port will be  
good.



## CHAPTER III

### FUTURE DEMAND OF DOMESTIC SHIPPING AND PORTS

In order to get a clear picture of the need of sea transportation to carry out the trade activities in Indonesia, the information of forecasting the future of national products and trade activities are significant.

Based on current statistics collected by the Government of Indonesia, we can predict a future increase for Indonesian domestic and international trade activities.

The national products of export commodities can be summarized as follows: (\*)

- Log/Sawn timber .....	= 18,000,000. M3/Year.
- Tin .....	= 20,000. T/ Year.
- Nickel .....	= 850,000. T/ Year.
- Bauxite .....	= 1,000,000. T/ Year.
- Copper .....	= 250,000. T/ Year.
- Sand Iron .....	= 400,000. T/ Year.
- Coal .....	= 3,500,000. T/ Year.
- Rubber .....	= 750,000. T/ Year.
- Others .....	= 1,236,000. T/ Year.

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(\*) Source : Indonesian Government statistic ; 1984.

While the need of transportation for inter-island distribution can be summarized as follows: (\*)

- Distribution of Rice ...= 400,000. T/ Year.
- *Distribution of Sugar* = 356,160. T/ Year.
- *Distribution of Wheat* = 35,000. T/ Year.
- *Distribution of Timber* = 150,000. T/ Year.
- *Distribution of Fertilizer* = 95,000. T/ Year.
- Distribution of Cement = 300,000. T/ Year.
- *Distribution of Others* = 150,000. T/ Year.

With such estimated size of trade in coming years, it clear that sea transportation is prerequisite and extremely important.

For additional datas herewiht we attached the recapitulation of the foreign capital investment which is approved by the Government according to location, and recapitulation of Foreign capital investment approved by the Government according to country of origin.

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(\*) Source: Government of Indonesia - Statistic 1984.

Recapitulation of foreign capital investment approved by the Government according to country of origin.-

Recapitulation of foreign capital investment approved by the Government according to sector,.

Country origin	Total Projects	Investment in mill USD	Sector	Total Projects	Invest in mill USD
	73	663.7	:Agriculture	58	297.4
Canada	5	863.3	:Forestry	64	669.6
Japan	208	4,343.7	:Fishery	28	159.2
East, South	16	163.7	:Mining	10	1,339.4
Hong Kong	134	1,193.0	:Food industry	45	301.8
Iran	4	129.6	:Textil Indust	69	1,350.4
Singapore	33	167.0	:Wood industry	23	227.9
Sri Lanka	17	47.0	:Paper indust.	13	146.8
Philippines	13	290.9	:Chemical	142	2,212.4
India	11	167.4	:Non Metal Ind.	34	621.3
Australia	35	226.8	:Basic metal	24	1,865.4
New Zealand	2	0.9	:Metal commodity	129	1,456.7
Belgium	14	93.1	:Other industry	21	50.8
Germany	4	34.3	:Construction	69	148.1
Italy	2	18.5	:Hotel Business	8	255.6
Netherlands	11	61.5	:Real estate	4	43.0
West Germany	43	551.1	:Transportation	17	138.8
Switzerland	21	295.0	:Trade services	5	32.1
France	46	286.7	:Other services	48	460.6
United Kingdom	20	247.1			
Sweden	8	64.5			
Denmark	7	21.6			
Norway	4	17.8			
Finland	4	16.8			
Spain	2	15.4			
Portugal	1	6.1			
Greece	2	2.4			
Other countries	2	0.5			
	69	1,787.9			
<b>Total</b>	<b>811</b>	<b>11,777.3</b>		<b>811</b>	<b>11,777.3</b>

Source : Capital Investment  
Coordinating Committee  
Government of Indonesia, 1984.



Determining factors for the future demand of sea transportation should be seen from two point of view as follows:

1. The demand for trade for transportation to increase rapidly.
2. The capability of sea transportation to cope with the trade requirements to be decrease.

Inadequate harbour facilities, lack of know-how and the use of unsuitable vessels are commonly the key factors underlying these problems.

Education and training of all personnel including the administration of the country involved is important.

The infrastructure in Indonesia seldom allows movement of unitized cargo from door-to-door. Existing roads cannot cope with containers, palletized goods or rolling loads. Adequate road haulage equipment is not readily available. Railways are not only inadequate to cope with the flow of cargo but also they exist only on Java and Sumatra.

This brings one to the whole question of what ought to be the relationship between those ports, the ship's builders and ship owners.

It is clear that the manufacturers in advanced countries design and finance ships at their will. ISO for example is going to introduce a new series of ISO freight containers which will result in the rebuilding of the entire port equipment; spreaders for gantry cranes, chasis, straddle carriers etc.

If this happens, the container terminal operators in the developing countries will be faced with high investments in redesigning present container equipment.

This must now be specially considered at the introduction of new transportation concepts for developing countries.

It is obvious that world trade will be more and more supplied by unitized or containerized cargo handling systems.

REgardless of the mode of transport by ship,by air,by road or by rail including the non-industrialized part of the world as well.

Efforts are made to establish world wide door-to-door transport systems under one freight document,one responsibility and very often involving more than one transport mode, i, e. intermodal transportation.

For ocean-going freights,there will be a dominance of large ships operated by round the world lines using the Ro/Ro and Lo/Lo concepts.

For economical reasons those large vessels will approach only a few central ports in each area to and from which we will find a steady cargo stream and efficient handling system, combined with an efficient organization.

This situation should be realized by the developing countries especially such as Indonesia whose geographical position will be affected accordingly.

In order to cope with all the situations mentioned above the Indonesians should take into consideration all aspects to determine what action has to be taken.

Usage of the right type of vessels for domestic shipping at least could solve some of the problems in the sea transportation system.

### 3.1. TYPE OF SHIP

Some of the determinant factors in designing the ship could be mentioned as follows:\*

1. Function of ship.
2. Kinds and quantities of cargo to be carried.
3. Route of ship, (long/short distance).
4. Sea state.
5. Port facilities.
6. Maintenance capability.

#### *3.1.1. Function of ship*

The type of the ship differ according to the function of the ship for which she is built. Merchant ships which consist of: general cargo ships, tankers, bulk cargo ships, specialized ships such as lumber carriers, car carriers, heavy cargo carriers, refrigerated ships, chemical carriers and passenger ships which consist of liners, cruisers, ferries, hydrofoils and hovercraft.

General cargo ships can be divided into conventional break bulk carriers, container ships and barge carrier (Lash).

Another type is the utility ship, which is known as work ships, such as tug, salvage craft, dredger ships, fire fighters, pilot vessels, navigational aids supply ships, patrol/rescue cutters, research/survey ships, cadet training ships, etc.

Fishing ships are another type of ship with special construction. This kind of ship include; trawlers, purseiners, drifter long liners, rod fishers and lancers.

The ship which is only used to carry special products

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(\*) . Ship Design, lecturer by Professor K.NOMOTO - WMU.

from the factory can be called industrial carriers. Sometime the product from those factories need special construction, in order to obtain the efficiency of the loading capacity.

The pleasure is another type with special construction, such as sailing yachts, cruisers, off shore-racers, racing craft, motor yachts, motor cruisers, motor sailers, motor boats, sailing dinghies and row boats.

War-ships consist of heavy surface type vessel such as, air-craft carriers, cruisers, light surface type vessels such as, destroyers, frigates, highspeed type vessels such as, submarines, killer submarines, mine-sweepers and landingcraft.

### *3.1.2. Kinds of cargo to be carried*

The kinds of cargo to be carried is one of the factors to determine the type of ships to be used, especially regarding inward and outward cargo, domestic or foreign trades of the nation.

The construction of the hatches and bridges and cargo handling equipment on board is determined by the type and volume of the commodity to be carried.

As far as the volumes and the types of cargo are concerned, these are obviously predicated by numerous internal and external factors. However, the reason why such cargoes pass through the ports which is also necessary to identify, is because this will in turn have the impact of various influences on the volume and the type of the commodities as these in turn will provide the basic reasons and factors of the sea transportation activities.

Insofar as this item is concerned, it will, as stated



above be in part predicated by volumes and types of cargoes. There are, of course, other major influencing factors such as the origins and destinations of the cargoes, the pattern of trade and the structure of the trade routes themselves.

### *3.1.3. Route of the ship*

The route of the ship is also one of the factors to determine the type and equipment of the ship. Long distance route ships usually have much more equipment and facilities on board of the ship than short distance service ones. Particularly when the ship also carries passengers, the provisions, fresh water, life saving appliances, etc, should be well prepared on board of the ship.

Both for the ocean going and domestic shipping services, the requirements of the International Conventions regarding the fitness, sea worthiness and safety of life at sea should be complied as well.

### *3.1.4. Sea state*

The waters situation has always been influenced and determined by some factors such as climate (temperature and wind force/direction), ocean currents, tidal range and currents, even though all of these factors are interrelated with each other.

These environmental situation is also one of the considerations in determining the type of ship which could be used in a certain region.

Accurate information of wind force, ocean currents and tidal currents is significant before we determine which

type of ships could be fit to carry out sea transportation in Indonesian waters, particularly to link all those small islands, which have relatively short routes locally or regionally and can accommodate shallow draft of ports, then we have to study the waters situations in general such as :

- a. Climate
- b. Ocean currents
- c. Tide and tidal range
- d. Waves
- e. Water depth.

#### *a. Climate*

The principle determinants of climate in Indonesia are its tropical location straddling the equator, and the seasonal wind and precipitation patterns associated with monsoonal circulation.

Indonesian waters are located between the landmasses of Asia and Australia and are the ideal monsoonal region.

The north monsoonal is most fully developed in January and February as the atmospheric high over Asia is formed and the equatorial trough is just north of Australia.

Over the South China and Andaman Seas strong northeasterly winds sometimes exceed a wind force of 5 (24 miles per hour or 39 kilometers per hour) in the South China.

Just south of the equator the prevailing winds are northwesterly rather than easterly, and southwesterly winds prevail farther south, over the area between Java and Australia.

The south monsoon is most fully developed during July and August. In the summer season of the northern hemisphere there is low pressure system over Indonesia and a high pressure system over Australia, which is experiencing winter. Indonesian waters lie between the two, and wind forces

over the open sea may reach a wind-force of 4( 13 Mph or 20-29 KmH but generally less over the Indonesian archipelagos.

In April ,May and September through November, conditions shift from the north to the south monsoon and the south to north monsoon,respectively.

Winds are generally weaker and less constant in direction, but during June they may reach a wind-force of 4 over the Arafuru Sea, and northeasterly winds over the south China Sea in November occasionally exceed a wind-force of 4( four).

#### *b. Ocean currents*

The prevailing monsoon winds in Indonesian waters drive the ocean currents, and strong circulation patterns are favoured by the orientation of the principle seas. The South China Sea with its general northeast-southwest orientation, has a circulation pattern "with its axes exactly in the main wind direction of both monsoons. Like wise the circulation pattern of waters between Sumatra and borneo(Kalimantan) is in the north-south direction, the same direction as the north and south monsoon winds.

The Banda, Flores and Java Sea are oriented predominantly east-west, as are the monsoonal winds. In other parts of Indonesia the influence of the steady monsoon winds creates less apparent shapes of the ocean basins, so the circulation of the waters is more irregular. In some cases the Indonesian Sea are freely connected with the Pacific Ocean, and circulation-patterns are affected accordingly. Herewith attached the figure which is taken from the Marine Geography of South East Asia. (see Annexes).

Despite the relatively strong currents, their flushing action pollutants tends to be weak due to their reversing directions, but the reversing system of the ocean currents can generate shallowness to the coast and harbour, particularly for the estuaries and port areas which are located near the mouth of the rivers.

On the other hand, along the east coast of Sumatra, in northern Java, in western Sulawesi, and almost along the entire Borneo coast where the rivers enter the sea, a delta is formed, and shallow off shore waters are turbid.

### *c. Tides*

Tide and tidal currents are important to navigation. That is why this factor should also be taken into consideration when designing and building the ships for a certain area.

Indonesian tide are characterized by low to moderate tidal ranges and a variety of tidal types: semidiurnal, diurnal and mixed. They are influenced by condition in the Indian and Pacific Oceans, with the characteristic semidiurnal tide of the Indian Ocean prevailing in the Andaman Sea and the Strait of Malacca and mixed tides of the Pacific occurring in the eastern Indonesian and Philippines waters.

In the South China Sea and Java Seas, mixed tides prevail. In this region the tidal range exceeds 4.6 meters (15 ft) but most is less than 3 meters (10 feet).

Tidal currents reach considerable strength in some of the narrower passages between islands, despite the generally low tidal range. During spring tides, currents reach 5 to 6 knots in some of the passages in the Sunda area.

In other passages tidal currents usually do not exceed 3

knots, but even so this can be troublesome to shipping.

#### *d. Waves*

In general, wave heights are not troublesome in the relatively sheltered waters of the Indonesia.

In the South China Sea, however, the strong monsoon winds cause high waves, and typhons that cross the northern part of the sea can cause mountainous seas. Eastward facing coasts are subject to high surf during periods of northerly and easterly winds that prevail during the north monsoon season affecting the patterns of local shipping activities.

Coastal wave heights are likewise high during southerly to westerly winds on the Indian Ocean coasts of Sumatra, Java, Bali, Lombok and Sumbawa.

#### *e. Water depth*

The depth of the waters is another factor which should be taken into consideration when designing and building of the ships, particularly in a certain area.

As we know that Indonesian waters are mostly shallow.

Indonesian ports can be divided into two types, which are very different in depth.

Some ports are what is called natural ports, which means that the ports are located in a certain place, which is very conveniently located on the bank of the coral reef and therefore sheltered.

The natural ports have automatically a deep depth and do not need dredging to be maintained, while most of the other ports are located in the estuaries with shallow waters, which always need dredging to maintain the depth

of the port's basin along the quays or jetties. This type of port cannot accomodate vessels which exceed more than three meters draft. The hinterlands of these ports produce a lot of commodities such as farm crops, rice, coconut, tea, coffee, chocolate and spices, which need transporttaion to carry their to places or islands.

#### *3.1.5. Port condition/ situation*

Port condition or port situation is yet one of the most important factor in designing the ship, which will utilized in the certain area or particular route.

In order to get clear picture of the ports conditions and situation according to the depth of anchorage, port's channel and berthing, here under we prepare some datas of the some of Indonesian ports, which is taken from the Indonesia Pilot Volumes : I, II, III, Published by GPD HALL, rear Admiral Hydrographer of the Navy; England, as follows: (see next pages).

TABLE OF PORT'S DRAFT AND PRINCIPAL ANCHORAGE:

No.	Name	Roadstead	Anchorage	Depth.
1	2	3	4	5
1.	Krueng Raya (+)	-	-	5 - 7 m
2.	Sigli (+)	-	3 - 5m	1.7 - 2.5 m
3.	Lhok Seumawe (+)	5 - 8 m	-	2.5 - 5 m
4.	Kuala Langsa (+)	4 - 7 m	-	3 - 6 m
5.	Meulaboh (+)	-	3 - 5 m	1.5 - 3 m
6.	Tapak Tuan (+)	4 - 5 m	-	2 - 3.5 m
7.	Singkil (+)	3 - 4 m	-	1 - 3 m
8.	Sibolga (.)	-	-	6 - 10 m
9.	Belawan (+)	-	10 - 15 m	7 - 12 m
10.	Asahan (+)	5 - 6	-	3.5 - 5 m
11.	Bagan Siapi-api (+)	-	4 - 6	2 - 4 m
12.	Dumai (+)	-	-	5 - 8 m
13.	Tembilahan (+)	3 - 5 m	-	2 - 3 m
14.	Rengat (+)	5 - 7 m	-	6 - 7 m
15.	Pekanbaru (+)	4 - 5 m	-	1.7 - 3.5 m
16.	Teluk Bayur (+)	5 - 8 m	-	3.5 - 6 m
17.	Jambi (+)	-	-	2.7 - 3 m
18.	Bengkulu (+)	5 - 7 m	-	3 - 5 m
19.	Palembang (+)	- 4.4 m	6 - 10 m	5 - 12 m
20.	Pangkal Pinang (+)	3 - 4 m	5 - 9 m	2 - 3 m
21.	Pangkal Balam (+)	3 - 5 m	-	1.5 - 2.5 m
22.	Panjang (+)	-	9 - 13 m	4 - 7.5 m
23.	Muara Sabak (+)	- 0.7 m	-	- 5.8 m
24.	Tanjung Uban (+)	-	-	- 6.5 m
25.	Tanjung Pinang (+)	5 - 9 m	-	- 3.7 m
26.	Kijang	-	-	- 9.7 m
27.	Merak (+)	9 - 15 m	11 - 22m	- 5 m
28.	Tanjung Priok (+)	9 - 13 m	- 9.4m	7.6 - 10.4 m
29.	Cirebon (+)	6 - 7 m	-	- 3.5 m
30.	Tegal (+)	5 - 7 m	-	- 2.1 m

(continued .....

1	2	3	4	5
31. Semarang	(+)	5 - 11 m	-	- 3.5 m
32. Cilacap	(+)	11 - 13 m	- 9 m	7 - 11 m
33. Gresik	(+)	-	-	- 3 m
				10 - 20 m
34. Surabaya	(+)	-	11-20 m	6.2- 8.4 m
35. Banyuwangi	(+)	18 - 20 m	7 - 13 m	- 1 m
36. Probolinggo	(+)		- 12 m	0.8 m
37. Sambas	(+)	- 2.1 m	-	- 4 m
38. Pontianak	(+)	- 5 m	-	- 1.4 m
				2.4- 2.7 m
39. Banjarmasin	(+)	- 1.2 m	-	- 3.7 m
40. Balikpapan	(+)	11- 20 m	- 7.3 m	4 - 6 m
41. Benoa (Bali)	(+)	-	- 18 m	3 - 5 m
42. Lembar	(+)	-	16-18 m	- 4.6 m
43. Dilly	(+)	- 49 m	- 20 m	5 - 7 m
44. Badas	(+)	20 - 5.5 m	- 26 m	- 5 m
45. Ende	(+)	- 20 m	-	3.5- 4.5 m
46. Kupang/Tenau	(+)	18 - 33 m	-	- 11.3
47. Tanjung Redep	(+)	-	-	- 4.9 m
48. Tarakan	(+)	-	- 30 m	- 4 m
				- 7.3 m
				- 14 m
48. Sangkulirang		- 6.1 m	-	- 5.4 m
49. Bontang	(+)	-	- 30 m	7 - 9 m
50. Samarinda	(+)	-	-10 m	0.3- 1.5 m
				- 3.2 m
				- 8.8 m
50. Makassar	(+)	15-48 m	20 - 23 m	8 - 12 m
51. Pare-pare	(+)	-	- 20 m	3.5- 8 m
52. Donggala	(+)	-	18 - 29 m	0.4- 1.5 m
53. Toli-toli	(+)	-	30 - 32 m	0.5- 2 m
54. Kendari	(+)	-	15 - 18 m	2 - 2.7 m
55. Luwuk	(+)	-	- 46 m	1.5 - 2.5 m
56. Posso	(+)	-	- 69 m	- 3.5 m
57. Lorontalo	(+)	-	- 80 m	3 - 5 m
58. Parigi	(+)	-	- 48 m	- 1.5 m



TABLE 5.3

1	2	3	4	5
59. Bitung	(+)	Under the Navy	- 53 m	5 - 9 m
60. Manado	(+)	-	- 55 m	0.5 - 1 m
61. Beo	(+)	-	-	- 2.1m
62. Kawio	(+)	-	27 - 37 m	- 2.2m
63. Tahuna	(+)	-	- 58 m	- 1.7m
64. Ternate	(+)	-	- 40 m	3 - 5 m
65. Ceram	(+)	-	- 45 m	- 3 m
66. Piru	-	-	- 29 m	- 3 m
67. Ambon	-	-	25 - 50 m	- 8.5m
68. Banda	-	-	Deep	Pier, drying.
69. Tanimbar	(+)	13 - 45 m	-	- 5 m
70. Sorong	-	20 - 31 m	-	- 12 m
71. Biak	-	- 11 m	-	- 9 m
72. Bintuni	-	-	-	Jetty - 10.5m
73. Fak-fak	(+)	-	-	- 3 m
74. Merauke	(+)	- 2.7m	-	- 5.5m
75. Jayapura	-	-	40 - 46m	6 - 8 m

Note: 1). source of data : Indonesia Pilot Vol.I,II,III.  
 2).Remark (+) mean that the ports are dredged.

### 3.2 FEASIBILITY OF USAGE OF MULTI CARRIER SHALLOW DRAFT RO/RO CONTAINER VESSELS

After knowing the main determining factors of usage a particular type of vessel in a certain area, we come to the conclusion which can be summerized as follows:

1. The function of the ship should be as a link between the many islands, and it should be possible for the ship to enter any port even if the ports are shallow and poor of facilities.
2. Most of the cargo transported in domestic trade consists of raw materials such as agricultural products, semi-final goods such as sawn timber, dry bulk cargo in bags and some of the imported cargoes such as vehicles, heavy equipment for industry etc, which can be defined as break bulk cargo or general cargo.
3. Route of ships in inter-island trade is short.
4. The situation of Indonesian waters is generally moderate, and most of the waters are shallow along the coast.
5. Almost all ports, except major gateway ports, are lacking facilities, specially cargo handling equipments for new appereances and modern cargo.

6. This is still a lack of capability to maintain sophisticated type of ships.

7. Usage of sophisticated and high technology's ships will have negative effect on the employment, because these kinds of ships will need less crews and less people to handle them in the port, (port's labours).

So far, the discussion has been made with Prof. K. Nomoto, about suitable types of ships to carry out the inter-island trades in Indonesia.

The following is one of the feasible types we have discussed. The original data has been supplied from STC- Consultant Co. Ltd. in Stockholm.

### *3.2.1. Special shallow draft shipping concept*

The shallow draft Multi-Carrier is the vessel designed for roll on / roll off container traffic. It offers a cargo capacity of 399 Dwt. and 1,000 Dwt, at a draft only 1.65 metres and 2.5 metres respectively.

Its features include.

1. Container crane-mounted on the upperdeck, with a lifting capacity of 36 tons and a jib outreach of 24 metres. This provides rapid and safe handling of 20-and 40 foot containers.
2. Bow DOOR Ramp system, the wide bow door offers simple roll on / roll off operation using heavy trucks and trailers. A fork-lift truck can pass over the ramp carrying a 20-foot container thwatships.

The shallow draft RO/RO Multi Carrier is a new type of RO/RO vessel designed for regions and areas dependent on waterborne freight or in which waterborne traffic is the primary form of transport.

The vessel has been specially designed for shallow waters. Thus, it is ideal for shallow harbours as well as for rivers and inter-insular traffic. It has substancial cargo capacity and can also be used for loading on to or from Ocean-going ships at anchor in the roads.

The Multi-Carrier can operate independently or as part of an integrated system. The Multi-Carrier has been designed primarily for efficient and rational container handling. However, flexibility is one of its main featuers and thus it has the capacity for several different types of cargo.

Its flexibility and maneuverability makes the Multi-Carrier a vital link in a door-to-door system.

### *3.2.2. Requires limited harbour facilities*

The Multi-Carrier's shallow draft, combined with its high capacity crane and bow ramp, means that it can quite easily load and unload at beaches and in small and simple harbours.

Apart from its superb container-handling capacity, the vessel can handle virtually every type of cargo such as general cargoes, bulk cargoes, wood, timber and several other types of raw materials.

Even in these applications, the shallow draft, bow-ramp and powerful crane play a significant role.

### *3.2.3. Alternative to costly harbour investments*

The Multi-Carrier's operating features, and its ability to enter small and primitive harbours, means that a minimum investment in harbour facilities is required. The Multi-Carrier can sail far up rivers and reach inland areas. A special designed vessel can form an integral part of the entire transport net-work, providing high freight capacity in relation to the investment.

This system has been developed and used in Scandinavia with a great success, the same system has been also developed as well in the Caribbean which consists of long coast-line and several islands, and a population of 50

million people; In West and East Africa which has along coast-line, several long rivers, a population of 120 million people; in China, which has a shallow coast and long rivers and a population of 1,000 million people and also in the Pacific Basin which consists of 11,000 islands and a population of 250 million of people.

For some areas it is quite obvious that the water-way is the only mode of transportation available, i.e., the Philippine and Indonesia. The Philippines has some 7,000 islands altogether, of which 800 are inhabited. The figures for Indonesia are 13,000 and 700 respectively. China and Africa has also a great number of small ports around its coast and a large number of navigable rivers which could also be utilized for RO/RO traffic.

The traditional methods of river transportation and coastal shipping utilize simple barges or small conventional ships. Neither of these carriers are convenient for the unit load concept and thus require special lifting and handling equipment at each port in which they are operating.

The solution is the door-to-door concept with an integrated transport chain. A special shallow draft shipping concept will be developed which could lead to diminishing the need for port investment such as dredging and heavy equipment which need huge funds and resources.

Based on Prof. K. NOMOTO advise and direction, the shallow draft RO/RO container vessel can also be used for break-bulk cargoes and/ or general cargoes, and as it is the best solution in Indonesia rather than using the conventional type of vessels.

#### *3.2.4. Technical information*

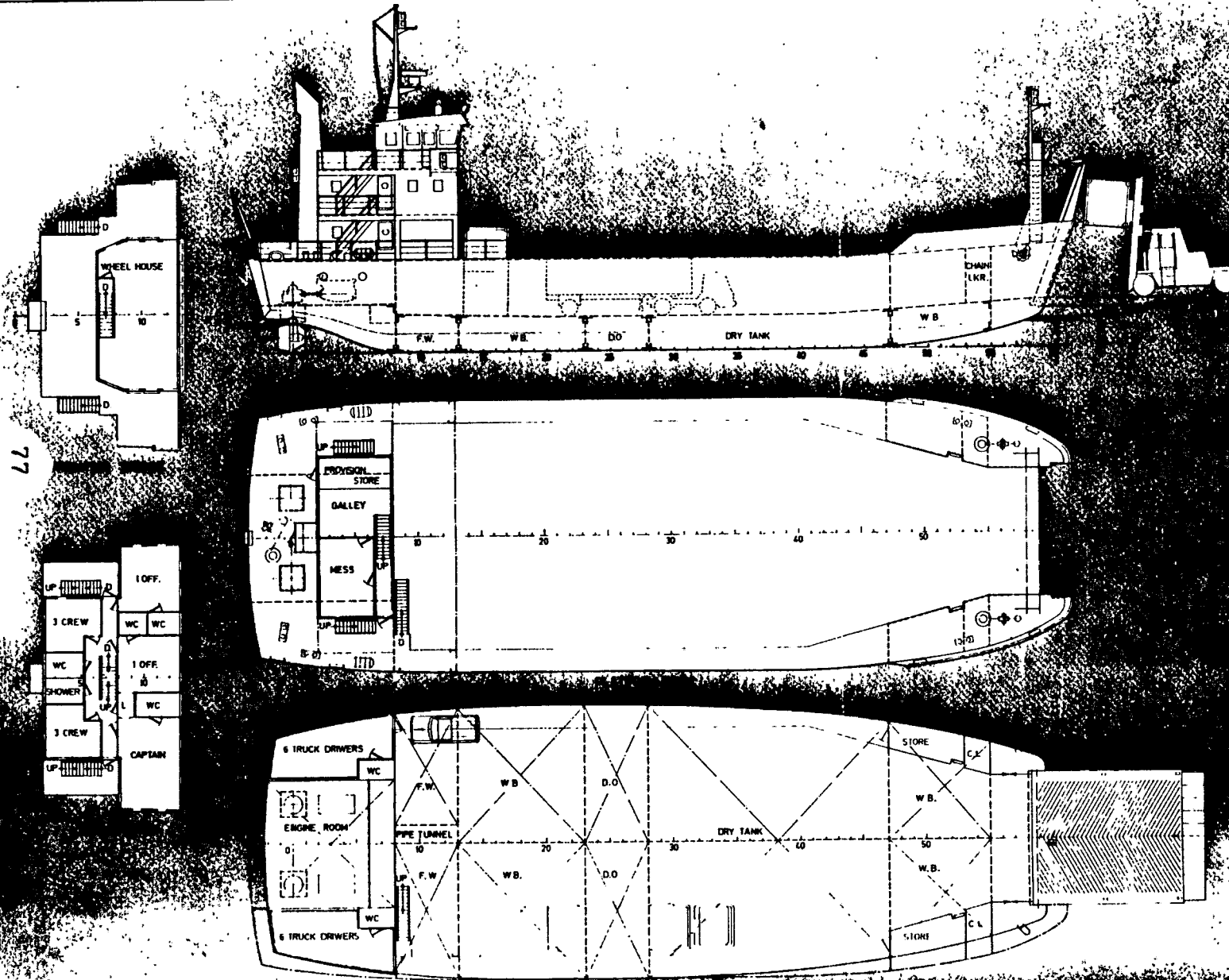
The technical information for such types of vessel mentioned above is attached to this project in order to examine the feasibility and the benefit of the usage of this type of vessel in relation with the above mentioned determining factors, in Indonesian waters and for carrying out Indonesian trades.

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Source of data: STC.Consultant CO. Ltd. Stockholm, Sweden.

# SHALLOW DRAFT NO/NO CONTAINER VESSEL

## 399 TDW at 1.65 meter Draft



### Principal dimensions

Length oa	47.00 m
Length pp	40.80 m
Beam	15.00 m
Depth	2.00 m
Draft	1.65 m

### Capacities

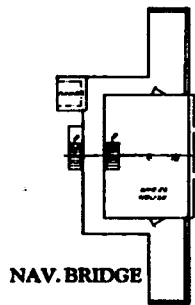
Deadweight	399 tons
Container total	50 teu
Trailers	10
Water ballast	300 tons
Diesel oil	75 tons
Fresh water	60 tons

### Speed and power

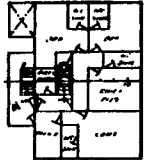
Power	2x300 kW
Speed trial	10 knots
Speed service	9 knots
Main generators	2x60 kW
Consumption 24 hours	2.7 tons diesel oil



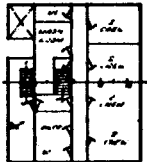
# SHALLOW DRAFT NO/NO CONTAINER VESSEL 1000 TDW at 2.50 meter Draft



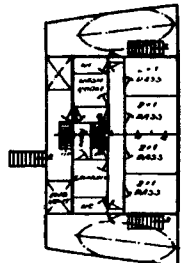
NAV. BRIDGE



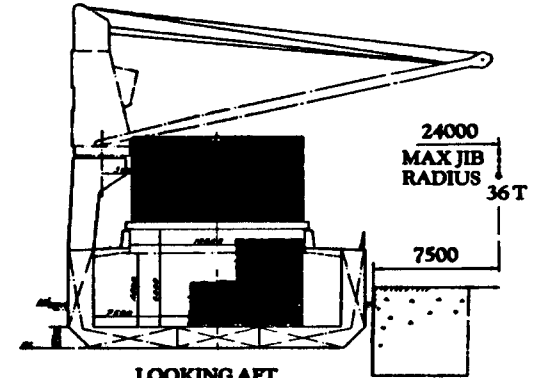
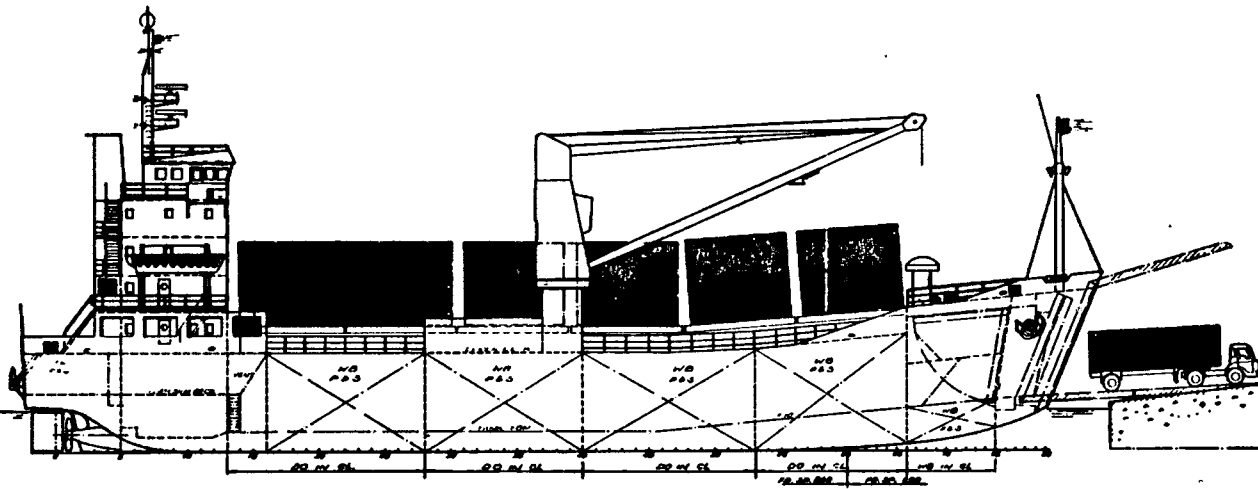
3rd POOP DECK



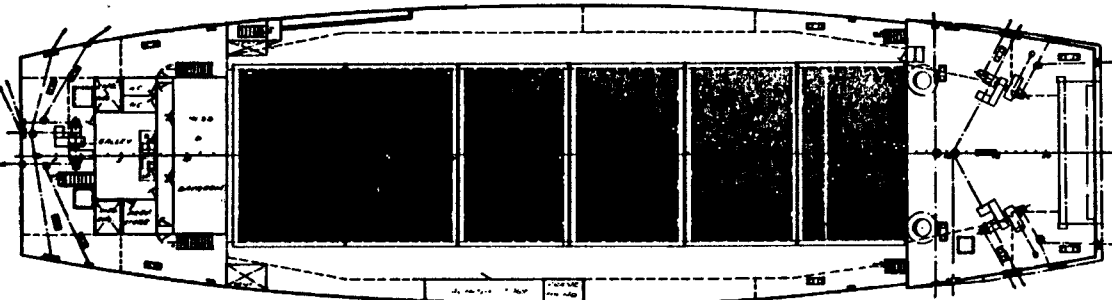
2nd POOP DECK



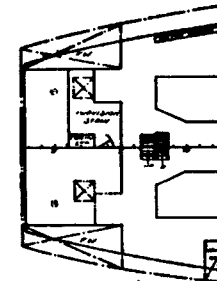
1st POOP DECK



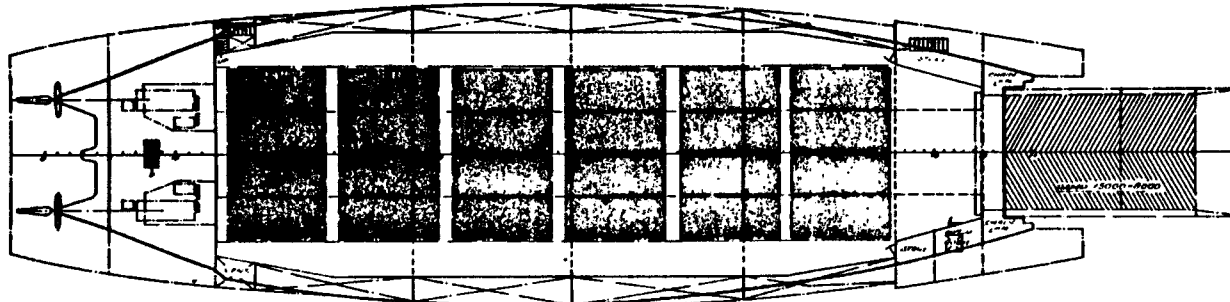
LOOKING AFT



UPPER DECK



PLATFORM DECK



TANK TOP

## Capacities

Deadweight	1000 ton
Cargo hold cap	3700 m <sup>3</sup> (130000 ft <sup>3</sup> )
20' teu cont. on deck	48
20' teu cont. in hold	48
Trailers on tanktop	15
Crane lifting capacity	36 ton
Crane outreach	24 m
Water ballast	1000 ton
Diesel oil	240 ton
Fresh water	100 ton

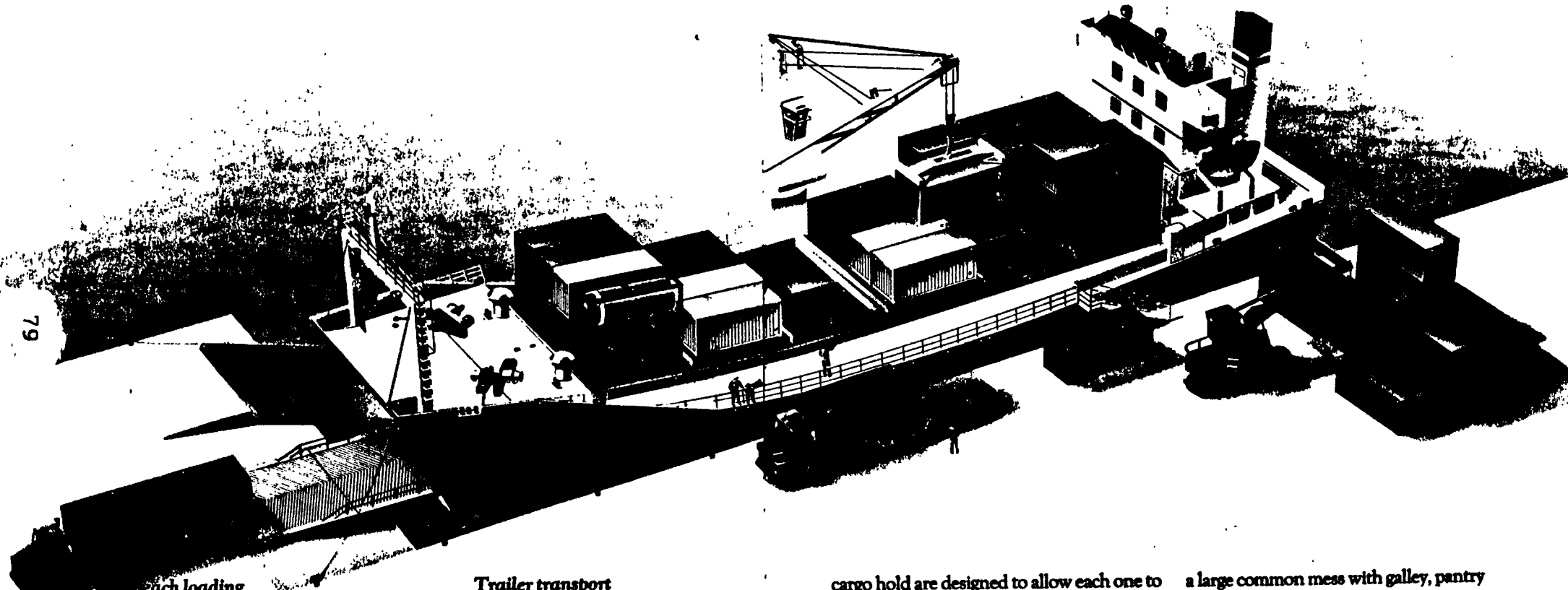
## Principal characteristics:

Length oa	65,60 m
Length pp	60,00 m
Beam	18,00 m
Depth	6,00 m
Draft	2,50 m

## Speed and power

Power	2x570 kW at 825/283 r/m
Speed, trial	11 knots
Speed, service	10 knots
Main generators	2x500 kW
Aux. generators	2x160 kW
Consumption, 24 hours	5 ton diesel oil

# ASG Transport Development AB - STC Technology AB concept can enter small ports whose draft limitations otherwise exclude vessels of this size.



## **Beach loading**

The forebody is designed to enable the vessel to carry out loading/discharging operations with the bow ramp laid directly on to the beach or quay. Using simple shore arrangements, trucks and trailers can drive on to the vessel. A distinct advantage of the Multi-Carrier is that its shallow draft design and beach-landing system permit, the vessel to come close to production and distribution centers.

## **Trailer transport**

Trucks and trailers can drive straight on to the vessel through the wide bow ramp. Thus, heavy transport vehicles can travel door to door, from island to island, far up rivers, etc. without extra time-consuming loading or unloading operations.

## **Large cargo capacity**

The Multi-Carrier carries two layers of containers on deck. The hatch covers for the

cargo hold are designed to allow each one to be opened independently of the others. Thus, loads bound for different destinations can be carried in separate sections and this in turn facilitates operations. The cargo hold is equipped with an electric ventilation system.

## **Accommodation**

The Multi-Carrier has cabins for officers, crew, truck-drivers or passengers. It features

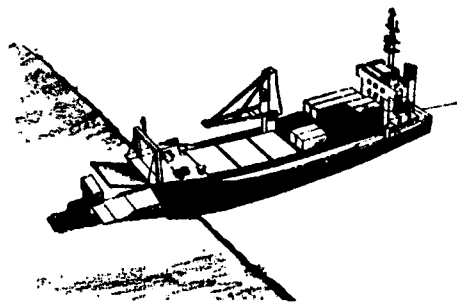
a large common mess with galley, pantry and food storage area compartments.

The vessel's toilets are connected to a septic tank, which can be emptied at sea or at a receiving station ashore.

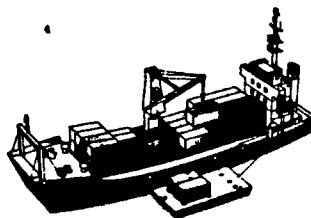
## **Ballast tanks**

The ballast system is comprised of side tanks and double-bottom tanks with large capacity.

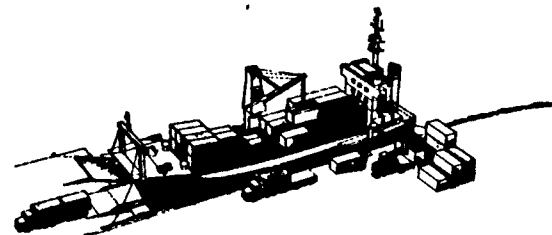
# Designed for areas where waterborne traffic is essential.



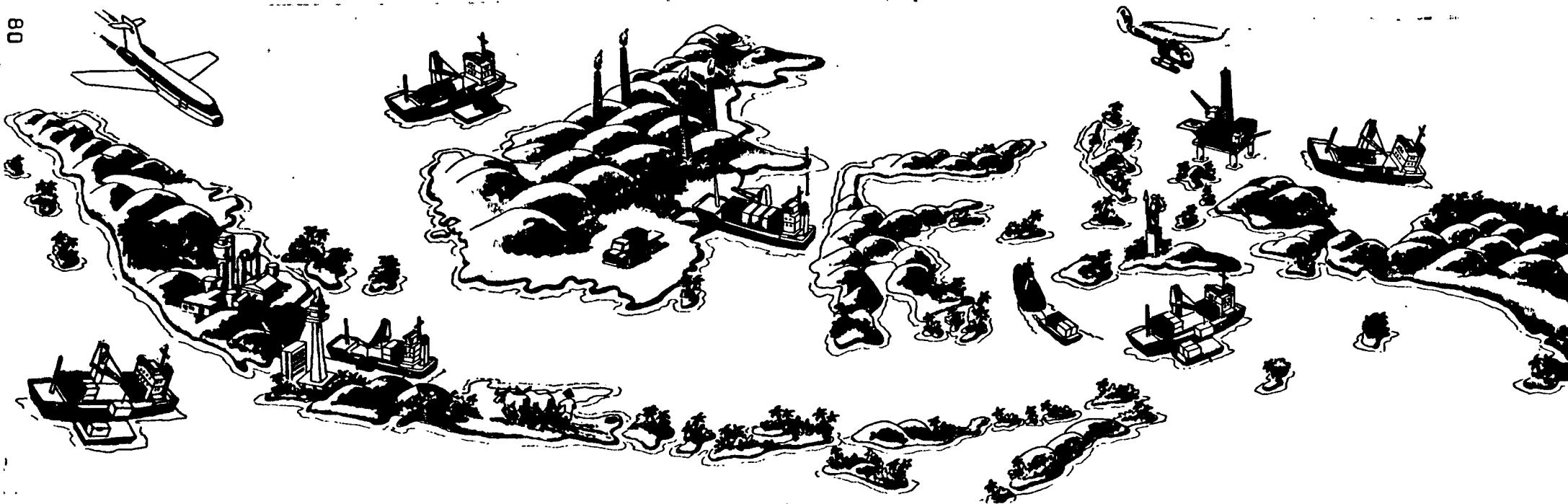
The beach-landing capability makes the Multi-Carrier independent of harbours and quays.



The Multi-Carrier can be used for loading on to and from ocean-going vessels at anchor in the roads. Similarly, it can equally well serve barges from a central island location.



Small harbours are seldom equipped with container cranes. The Multi-Carrier features its own high-capacity container crane for loading and unloading. The bow ramp, which can cope with extremely high axle weights, permits trucks and heavy forklift trucks to drive straight on to the vessel.



### *3.3.1. THE ORGANIZATION OF A PORT*

The Port structure is now matter of technical modernizational change, highly evident in the industrial areas but quickly becoming increasingly noticeable in the so called developing countries.

Whatever the structure however, any one port will differ in degree from another according to the trade it attracts. There is no one, hard and fast rule or standard for port organization and administration, although similarities show up, be it in a large or small port. (\*)

Nonetheless, the powers of port authorities to fashion their functions and activities are to be found in legislative acts of national policy and within those guidelines for port design and implementation of their administration relative to the organization which the legislation suggests.

In Great Britain much of this is contained in the Transport Act of 1962; the harbours act of 1964 and the Dock and Harbours Act 1966.

Acknowledging that such legislation is subject to change or modification according to the prevailing political climate. Foreign ports have similar comparable legislative requirement.

In Indonesia much of the guide lines for ports design, administration and organization is contained in the P.P. No.2 of 1969; so called Peraturan Pemerintah Nomor Dua or Government Act No. 2 of 1969; according to regulation and administration, while the Act deals with organization contained in K.A.B. 434 Act of 1969.

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(\*).CARGO WORK; by Capt.L.G.Taylor, Tenth Edition :P.313

If in Great Britain ports are classified as major ports, which are highly complex and available for all forms of traffic and small ports which, by virtue of size, have restricted availability though, in their fashion, can be as effective as the larger undertakings.

Particular classification covers tanker ports, ferry ports and fishing ports, although invariably these are part of the larger port conurbation and retain the title only from historical interest.

In countries other than Great Britain equally varied arrangements apply, with state, municipal, and private ownership.

It is different situation with the ports in Indonesia, which are all state ports. But the ports are classified as Gateway ports (Tanjung Priok, Surabaya, Belawan, Makassar), or so called A class, and collector ports, or B Classports, trunk ports which consist of C class ports, and feeder ports, while particular classification covers Oil ports, Gas ports, Cement ports, Fertilizer ports, Ferry ports, and Fishing ports.

Free ports remain part of ports organization, through mostly confine the areas where facilities for discharge and warehousing of cargo, such as for transit, for avoiding Custom jurisdictions.

Within itself, a port is a complete undertaking embracing a multitudinous collection of functions, procedures and techniques necessary to the reception, loading and discharging of ships.

In the smaller ports these procedures are more easily definable and workable but in the larger contributions the complexity of operations are dictated by the need for a dynamic and flexible approach, not the least of which is in the area of planning and forecasting maritime and economic behaviour.

The earlier definition of a port being a place to which ships resort to load and discharge cargoes is now an over simplification of the term.

The new dimension is that of an industrial unit closely tied to business and commerce over the " Catchmen area" which serve and, as such, is part of the total overall local area and national economic policy to which position and effectiveness is subscribed.

Port now primarily devote their attention to classes of ships -- not just ships.

Ports, therefore, have basic individual requirements, supported, mainly among others by; listed below:

- 1). Suitable and adequate equipment and services
- 2). Appropriate operational activities.
- 3). Supporting financial, commercial and economic services - the latter involves marketing
- 4). A flexible labour policy, both quantitatively and qualitatively.
- 5). Integrated association with agencies which use the port and promote the distributional functions, such as transport undertakings, forwarding agents, customs etc.
- 6). Association with shipping companies which use the port, either on contract or common user berth arrangement.

As an illustration: both the ship and the port are " service industries" within the wider overall transportation mode to serve the trades and, as such, cannot be fully effective unless its own services integrate with those of the other. A high degree of well trained people who are in charge is needed.

### *3.3.1. IMPORTANCE OF PROPER PORT ORGANIZATION*

The main duty of every port administration is to organize in a proper and efficient way the complicated and very diversified flow of traffic through the port.

The very purpose of a port is to provide prompt and economical services to all port users, to ships, cargo and passengers.

Movement of vessels, handling and storage of cargo, customs, and delivery formalities, evacuation and supply of the cargo by road, railway, and waterways must be well organized and strictly coordinated in order to avoid delays, congestion and chaos.

Usually, many functions connected with the above activities are performed not only by the port administration, but also by private firms such as shipping agents, stevedoring companies, transit agents and brokers, or by the various departments of the government such as the Customs, the Health and Immigration authorities.

But, the ultimate responsibility for the smooth working of the port rests clearly with the port administration, regardless whether the port is autonomous or under direct governmental or municipal control.

The administration of the port, whatever its form, has been created for these principal tasks, overriding all others, to make the port work to the utmost benefit of all concerned.

The first basic aim is to make the best possible use of existing facilities, however limited they might be. Better services and increased capacity should be sought not only by the physical extension of the port,.....

but also by improving all aspects of activity within the port.

It may happen that reasonable requirements of the traffic can be satisfied without building new wharves or piers, but simply by eliminating unnecessary bottlenecks, be it through modification of cumbersome procedures, adding relatively inexpensive equipment; adjusting storage tariffs in transit sheds or by improving cargo handling methods.

The second correlated aim is that of minimizing the operational cost incurred by all concerned, the port, the vessels, private contractors and or companies and the cargo interests.

Speed of operations is one of the best methods for achieving both goals; increasing capacity of existing facilities and low costs. Time is indeed a major factor with respect to the yearly turnround of cargo on a berth and to costs of a vessels stay in the port.

How long a berth is occupied by each vessel will depend on the speed of loading and unloading cargo and on how many vessels can be handled in berth per week, per month and per year.

The greater that number the higher will the port's income from the berth be and the less urgent will the need for building an additional berth be.

For vessels, each extra day spent in the port due to waiting or to slow dispatch, means a loss of two or three thousand dollars (depending on the size of the vessel) on fixed expenses alone such as interests, amortization, insurance, crew wages etc.

For cargo handling contractors, a slow pace of loading and unloading results in higher labour costs and in a low



degree of utilization of mechanical equipments(if it is used). While for cargo interests, a slow processing of imports means higher storage costs and delayed final delivery, in addition to frequent waiting time of trucks and lorries before consignments can be taken out for transport to final destination.

Still longer waiting periods may result for vessels if export goods are not unloaded from trucks and prepared for loading with sufficient speed.

Speed of operations on a general cargo berth should not necessarily be sought as an endeavour to handle an exorbitant number of tons per hour. A regular pace of work, without interruptions and without one set of equipment or one team of workmen having to wait for completion of the work, by another set, is a much more important condition to arrive at a high daily average, which is all that really matters.

The periods of unnecessary idleness of equipment and men during the working hours should be reduced to a minimum, except for reasonable rest periods if work is very hard. High speed should be achieved through careful organization and improved techniques but never through excessive physical efforts by port docklabour.

There are two essential limitations on the pace with which vessels and cargo can be processed through the port, one of these is safety.

Vessels must be maneuvered in the port waters with great caution and skill and without undue haste.

Cargo must be handled carefully so as to avoid danger of damage or loss. And above all, accidents and injury to persons should be prevented by every possible means.

The second limitation may be the cost factor.

If high speed cargo handling is to be obtained by an exorbitant expenditure on costly equipment which may not

always be used, or through very high costs of over time , night work and work on holidays, the result could be counter productive. Extra expenses might eradicate all benefits of speed.

In most developing countries, over time and work in two shifts can easily be arranged at a reasonable cost, and it may be one of the best means for increasing output over the berth and improving turnaround of vessels.

But, in many advanced countries, with very high hourly wages of port labour, double pay on Saturdays and Sundays as well as extra allowances for dirty or dangerous work, the cost of speeding up may become prohibitive.

The situation is opposite with respect to expensive equipment. In ports of developed countries, the purchase price is lower than in developing countries, particularly regarding long distance and the degree of utilization is higher.

The impact of the relative capital expenditure on operating costs is therefore much more moderate.

Conversly, should the port of developing countries install a one million dollars container crane in the domestic port, wich would be used only two or three days a month; then the financial burden on port administration will exceed the benefits derived from a very small number of container vessels visiting the port.

A less perfect but much less expensive piece of equipment may be a better means for keeping the mutual benefits in a reasonable proportion.

To achieve the most advantagous way of increasing the port capacity and accelerating the turnaround is by inexpensive means, particularly for the ports which are only used for domestic shpping vessels.

This requires a very meticulous and accurate scrutiny of all phases of port operations, in order to find out .....

the weak points of the system and to devise remedial measures. Sometimes a very trivial matter may contribute to a slow down of movement of cargo through a berth, as for instance uncoordinated office hours of customs officials and port personnel, poor methods of preparing exports for loading into vessels, and, above all, cumbersome regulations and slow evacuation of cargo from transit sheds. It costs little money, if any, to correct such shortcomings.

Finally it can be noticed that a frequent repetition of minor delays can easily have a serious negative impact on the speed and productivity of port operations.

The method of system analysis should be applied for improvement of port operations, with the main emphasis on procedures and on organization rather than on using very expensive equipment. Possible technical deficiencies can be detected at the same time. To use more common and less scientific language, a port should from time to time be examined in a similar way as a doctor examines his patient.

For a scrutiny of port operations, experiences and direct observations are to be used, supported by accurate operating statistics and complaints or suggestions from port users. The highly scientific approach can be applied to determine which combination of modification and improvement would give the best results, either the lowest overall operating costs or the fastest dispatch.

If both aims, low costs and high speed, can be obtained simultaneously, through the same set of improvements, the best alternative has obviously been found.

If a very fast dispatch and a minimum of waiting time can be achieved only by raising the average operating costs,

a reasonable intermediate solution could be devised. Slightly more expensive measures could be applied in order to obtain a higher speed of operations, provided the increase of overall costs is found acceptable. Better dispatch can attract additional traffic and it may off set the burden of higher expenditure.

It should be remembered that simulation tests require a very careful preparation by experienced staff and can be successfully carried out only by personnel well familiar with computer techniques. In this case skill and knowledge which is gained from the well educated staff are needed, in order to obtain the best result.

Since there is no experienced and well educated staff familiar with computer techniques to develop ports it would be safer to rely on simpler conventional methods for investigating the functioning of various port activities and for selecting alternative improvements.

Conclusions may not be as accurate but, on the other hand danger will be avoided of obtaining misleading answers due to errors in preparation of computer programs.

A simple system can be adopted, for example, in every large port with a numerous personnel.

It may be a good practice to have a small team of capable efficient experts, free of daily routine, who could devote all their time to observing the flow of traffic, finding out deficiencies, supervising time studies, conducting experiments with modified methods and suggesting improvements.

They should also carefully examine complaints and suggestions of port personnel and port users.

### *3.4.2. Port facilities*

In order to enable every port to conduct its operations in the most efficient way, particularly to serve ship handling and cargo handling, facilities are needed.

The adequacy and preparedness of port facilities determine the fulfillment of interest or objective of various parties minimum are shipowners or ship operators and shippers or cargo owners.

Adequacy means the amount ( total numbers ) and types (quality) of the facilities available and consistence with the demand for it.

While preparedness means that the availability of the facilities at conditions considered safe for ships and cargo handling.

Usually in every port there are three division managers responsible for the availability of port facilities; they are: Pilot Division for ship handling and Service Division Manager and Traffic Division Manager for shore facilities and cargo handling equipment, including dock labours.

For the supporting facilities there are two parties involved i.e.

- Navigational Aids Department.
- Private companies.

Inadequacy of port facilities will increase the port-days of the ships and stagnation of cargo handling etc.

This increase will certainly result in higher unit prices of every commodity handled by the port.

Hence, indirectly, the adequacy of facilities in any port determines the price of the goods in the area.

Those port facilities can be divided into three main....

groups and supporting facilities:

a. Shore facilities;

Berth, quays, sheds, warehouses, open storage, container yards and dock labours.

b. Cargo handling equipment:

Cranes, forklifts                      trucks, lorries, jumbo cranes, conveyors etc.

c. Ship handling facilities:

Tug boats, mooring boats, pilotage, etc.

Other supporting facilities which have to be mentioned in conjunction with sea transportation and port operations are port channels, dock yard space, ship's repair, navigational aids and traffic control.

In developing countries where the technology is not so much used, labours are one of the important elements of the port facilities.

Labourer productivity determines the productivity of the whole cargo handling operation.

It also has some bearing on cost components of any cargo handled by the port and also on the competitiveness of any port in comparison to others.

Working capability and the skill of the dock labourers make sure that the standard productivity will be achieved. On the other hand, the composition of a gang also determines the actual performance of productivity.

Generalizing, port equipment which is primarily important includes: cranes, forklifts trucks, tractors, trailers, stacking carriages and port labourers for backing up transportation and movement within the terminal area.

No doubt that the suggestion of using the multi purpose crane and forklift truck and stacking carriages has possibly made the greatest impression, especially for the port in developing countries.

The reason is that this equipment can be used to handle all types of cargoes and or commodities, which are mostly break-bulk cargoes or bagged cargoes.

The multi purpose system provides a type of vessel which has prominent facilities for the carriage of mixed cargoes. The term multi purpose is one of variation.

The basic form is general cargo ( break-bulk cargoes ), which is called conventional cargoes.

## CHAPTER IV

### THE MAIN PROBLEMS

In order to know the main problems which the sea transportation system is facing, we have to know first of all what the main purpose or objective of the subject concerned is.

#### *4.1. Problems regarding shipping*

As mentioned in chapter II, the Indonesian Government regulation No.2 of 1969, requires that domestic shipping is entirely carried out by National flag carriers (Cabotage), whereas in International shipping fairshare principles are maintained. The main purpose of this decree or regulation is clear and understandable.

But, in fact, when we study the current situation of the Indonesian shipping, we can find that even if the total tonnage of the National fleet for domestic shipping is almost of three million tons, there still about 2.8 per-cent of total domestic trade is carried out by foreign flag vessels.

This is clear evidence that the national fleet cannot yet fulfill domestic trade requirements, while in international trade, shipping requirements cannot be met by the Indonesian fleet at all.

Some impediments which are creating the problems could be mentioned as follows:



*4.1.1. The main impedements in Indonesian shipping.*

- a. The general tendency is the growth of obsolescence and the increasing incapability of Indonesian sea transportation to keep up with the increase of the modern trade requirements.
- b. The aging fleet is still predominantly engaged in conventional cargo transportation, particularly before the execution of the government decree of 1984, regarding the scrapping of 25 year-old ships. Entrepreneurial activities are impeded by the lack of funds, since the purchase of modern vessels ( ocean going and inter-island ) capable of meeting to the latest shipping requirement, that to deal with all modern and cargo physical appearances, which require huge investments.
- c. In addition, managerial and operational skills are needed to run these vessels profitably and successfully in view of the fierce competition in international shipping.
- d. Indonesian shipping is still tied to conventional principles, that is calling on many ports to collect or distribute cargoes, causing prolonged round voyages times, entailing insufficient freight revenues in relation to the cost of shipping operations.  
Consequently, on their turn, tend to be high and burden cargo movements by ship significant.
- e. The need for systemization, rationalization and reduce turn-round time in the ports are factors of

increasing importance.

*4.1.2. The main impediments in inter-islands  
communication ( domestic shipping )*

After doing some studies of the current situation and of other resources in relation with the domestic shipping, there are at least five factors showing deficiencies and the present problems could be mentioned as follows;

- a. Regularity and reliability leaves much to be desired.
- b. Frequent deviations from official routes to the detriment of shippers and consignees in neglected certain ports.
- c. Exclusion of smaller ports from regular services, forcing shippers to sometimes charter space on regular liner vessels or forcing local authorities to order vessels port calls to get important shipments carried out.
- d. Insufficient damage/ pilferage prevention, which encourages direct shipments, resulting in deviation from the official sailing schemes and the exclusion of ports calls mentioned therein.
- e. The absence of trans-shipment, forces traders to buy at local markets and arrange direct shipment to the consuming centers either by regular liner services based on separate negotiations or by motorized sailing vessels.

#### *4.2. Problems regarding ports*

Before we come to the problems which the Indonesian ports are facing nowadays, it is better to discuss the main points of the ports themselves, such as their main functions from different definitions of a port.

In fact, there are so many definitions of port which depend upon from which point of view the port is looked at.

Talking about the function of the port, maybe we can summarize as follows:

- Commercial ports
- Public service ports,
- Strategical ports or combinations.
- Special ports.

However, a port is a terminal point where seaborne transportation commences and terminates.

In order to fulfill its function, a port has to be facilitated properly with adequate infra / superstructures and equipments.

The main functions which have to be carried out by every port to achieve its objective are:

- How seaborne transportation activities are being handled.
- How cargo can be cleared quickly through the port.

It is meant that there are two basic activities of the port are:

- ship handling and
- cargo handling

When we look at literature there we can find many more definitions of a port, one of them was defined by Professor Boudelaire of France. Professor Boudelaire in his book as follows:

" The port is an interfase to provide facilities and services required for the transfer of cargoes from one mode of transport to another. This interfase is usually established in in a sheltered area to protect the mode of transport from the elements of nature and to ensure safe conditions required." (\*)

This definition is very comprehensive and understandable.

But, Eng.C.B.KRUCK of the Netherlands, in his lecture during my on-job training in the Netherlands, gave additional words to the aspects of the above definition as follows.

The port is also a generator for economic development, earners of foreign currency, employment area and income tax earners.

From the definition of Professor Boudelaire and the addition of Eng.C.B.KRUCK, we can derive the following key-words.

Interfase or gateway, facilities, services, transfer of cargo, economy and employment.

Port are nothing but a link in the chain of transport and we are all aware that the strength of the chain is deter-

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\*.Port Management by Professor BAUDELAIRE , France.

mined by the weakest link and ports should avoid to be that weakest link.

We are also aware that a description of detailed manament requirements for a port can never be completed, but there is an indication of general management principles which may provide an insight into the many complex interrelations in the port industry.

In general terms it can be stated that cargo movement in Indonesian ports has been increasing far more than the port capacities, either expressed in floor space in quay length, resulting in a marked increase of the intensity of utilization of port facilities.

The problems which at the moment are facing the port operation sector are different in the big ports in comparison with the other smaller ports.

But, in general, however, there are four factors which prevent the effective and optimal functioning of all the ports as stated below:

- a. Shortcomings in port infrastructure ( maintenance backlog, insufficient replacement, renewal and extension of port facilities ).
- b. Inadequate port lay-out ( obsolete port facilities, less capable of coping with increased requirements of greater size, weight, dimension of cargoes in their new physical appearances -unitized / palletized/ containerized cargoes ).
- c. Lack of effective cargo handling equipment, to successfully handle sizes, shapes and dimension of modern cargoes.
- d. Weak terminal operation, causing ineffective berthing times and prolonged turnaround time of vessels.

In order to identify the problems more specifically, all of the Indonesian ports should be divided into four main

groups rather than three groups as the composition of the M.S.D.P. ( Maritime sector development programme ), and should be based on the flow of ships and flow of the cargoes.

*1. First class ( A class ) ports:*

---

- Tanjung Priok, in the west of Java.
- Surabaya, in the east of Java.
- Belawan, in north of Sumatra.
- Palembang, in south of Suamtra.
- Makassar, in the south of Sulawesi.

*II. Second class ( B. class ) ports.*

---

- |                |               |
|----------------|---------------|
| - Lhok Seumawe | - Pontianak   |
| - Teluk Bayur  | - Banjarmasin |
| - Dumai        | - Balikpapan  |
| - Pekanbaru    | - Samarinda   |
| - Panjang      | - Bitung      |
| - Sunda Kelapa | - Ternate     |
| - Cirebon      | - Ambon       |
| - Cilacap      | - Biak        |
| - Semarang     | - Sorong      |
| - Batam        | - Jayapura    |

*III. Third class ( C class ) ports.*

---

- |                         |                   |
|-------------------------|-------------------|
| - Krueng Raya           | - Probolinggo     |
| - Kuala Langsa          | - Benoa ( Bali ). |
| - Sibolga               | - Lembar          |
| - Tanjung Pinang        | - Kupang / Tenou. |
| - Munthok/Bangkal balam | - Dilly           |

- |                    |                       |
|--------------------|-----------------------|
| - Jambi            | - Gorontalo           |
| - Bengkulu         | - Pantholoan/Donggala |
| - Cigading / Merak | - Pare-pare           |
| - Tegal            | - Kendari             |
| - Gresik           | - Merauke/ Fak-fak.   |

IV. Fourth class, is the ports which are not mentioned in the above list, and consists of a number of the smallest ports spreads over the Indonesian archipelagos.

Problems which faced the five main ports as mentioned in group one are generally improving and maintenance in order to increase the ports capability in order to cope with the requirements of international trades which is required of handling bigger size of ships with their deep draft, greater size, weight and dimension of cargo units in their new physical appearances.

The smaller ports, as mentioned in group two, are also divided again into two groups according to the type of the port.

Most ports approximately 85 percent need to maintain the depth of draft in the port's channel and the port's basin, while a few number of ports which are called natural ports, which mean they are located in the places which already have deep waters, and do not need nay dredging to maintain the depth.

Some ports also have adequate enough facilities, which means that they can cope with the need of the flow of the ships and flow of the cargo ( but some of the facilities were rather old and no longer need to be renewed ) and a few of the small ports completely lack or have poor facilities.



Particularly the smallest ports, most of which are very poor concerning all ports facilities ; no quays, only poor jetties, without break water, no tug boats, lack of cargo handling equipment and also poor of terminal operations, causing ineffective port performances. In other words, these are ports sometimes only port in status, and not in performance.

Whereas, the function of these ports are significant in order to promote all aspects of the sea transportation as mentioned in chapter I, i.e, promotion of trades, promote of sea activities, dispersion of population, unification of the nation and national defence as well.

The ports which have their own problems have been covered by yhr ILS team system, will be solved, whereas for the smaller ports which are exceeded from the ILS scheme still remain as problem to solve.

## CHAPTER V.

### CONCLUSION AND RECOMMENDATIONS

#### 5.1. SEA TRANSPORT IN GENERAL.

##### *5.1.1. Inter-island.* -----

As economic growth reaches the take off point in a large developing country such as Indonesia, which is an archipelagic and maritime country, there will be a rapid need for sea transport as a dominant factor.

Indonesia consists of thousands of islands spread all over the Indonesian waters, with the large areas covering about 2,941,416 square miles of claimed sea territories. This large area is creating the need of seaborne transportation in order to be able to carry out its functions which are already mentioned in chapter I; as follows:

- a. To promote trade activities, in order to be able to exchange local products of those many islands.
- b. To support sea activities such as fisheries and mining.
- c. To support the dispersion of the population, in order to equalize the country's population density.
- d. To support the unification of the nation, with

the smoothness of sea transport and as a result people get to know each other because they move from one island to another.

- e. To support the national defence, especially in time of war and political instability periods.
- f. To provide employment, because sea transport and port operations themselves are so labour intensive that they can provide and create more jobs to the population.

All of the above aspects have a strong relationship and effect on the economic development. Inadequate sea transport means, hampers the economic growth, and in other words, it hampers the development of the country.

To spread economic development equally among all national regions, a proper sea transport policy should be considered.

Therefore, there is no doubt that the role of the sea transport in the economic development in Indonesia is consequently significant.

#### *5.1.2. International ( Ocean - going )*

The geographical position of Indonesia is located at the international shipping trade passages both west and east bound.

Thus Indonesia is not economically and politically isolated from the International fora.

With the nation foreign trade expanding, the requirement for stable and timely transportation of cargo has made the shipping industry an essential part of the economic performance of the country.

The Government which had come to recognize this important role should formulate the consolidated shipping and shipping promotion plan.

Indonesia has to follow the development of the international sea transport system, until a certain level is reached, in order not to break the multi-modal chain creating more cost to the commodity which is transported.

## 5.2. SHIPPING

### *5.2.1. Domestic ( inter - islands ).*

The main function of the domestic shipping is to link all Indonesian islands.

The fleet capacity and capability of domestic shipping need to be developed, in order to meet the increase of the trade requirements.

Regularity and reliability leave much to be desired.

Indonesian shipping is still tied up to conventional principles, calling on many ports to collect or to distribute cargoes, causing prolonged round voyage time, entailing insufficient freight revenues in relation to the cost of operation. The need for systematization, rationalization and reduction in the turn round time in ports is advisable. These factors are of increasing importance.

Managerial and operational skills are also needed to run these vessels profitably and successfully.

### *5.2.2. International ( Ocean - going ).*

Indonesian fleet capability and capacity in carrying the international trade for export ( particularly tankers and bulk carriers ) and import cargoes ( especially heavy loads and new appearances and dimension of size and weight cargoes ) need to develop in order to follow the development and requirements of the international trade system. Usage of medium and high technology is advisable in running international ( ocean going ) vessels.

This is also needed in order to succeed in view of the fierce competition in the international shipping fora. Managerial and operational skills are also needed in order to run national vessels profitably.

### *5.2.3. S H I P S*

The aging fleet is still predominantly engaged in conventional cargo transportation.

Most of the ships which are used for carrying out the domestic shipping are conventional vessels. This type of vessels are mostly with deep draft.

The conventional type of vessels, handling mixed cargoes in break-bulk fashion, are highly labour intensive.

The bottlenecks in conventional shipping are:

1. The time factor of slow port turn-round,

2. Coupled with high (labour) stevedoring cost,
3. Inability to cope with the new requirements of the trade system - containerized - palletized.
4. No entrance to all ports (domestic ports), because they have shallow depth, while the conventional vessels have a deep draft.
5. Need of the port's cargo handling equipment, both legs of trade where the conventional vessel operates.

In order to solve the above mentioned problems, the usage of the right type of vessels is thus recommended. In this context, the usage of the shallow draft multi-carrier RO/RO container vessels should be promoted. Such ships could easily be built in the national shipyards. This would initiate shipping activities and a ship building industry in the country.

The advantages of the shallow draft RO/R multicarrier container vessels are:

1. Vessels are specially designed for shallow waters.
2. They are ideal for shallow harbours as well as for rivers and inter-insular traffic.
3. Multi carriers can operate independently or as a part of an integrated system.
4. Multi-carriers are primarily designed for effi-

cient and rational container handling, but flexibility is also one of its main features and thus it has the capacity for several types of other cargoes, including break-bulk and raw materials, and palletized as well.

5. Multi-carriers, have relevant operating features, with the ability to enter small and primitive harbours, which means that a minimum investment in harbour facilities is required and expenditures in dredging which is approximately \$25 million per annum is also reduced.

Using this type of vessel can form an integral part of the entire transported network. This will provide a high freight capacity. Further it will reduce the demand for investments in the ports, which form a difficulty for most developing countries.

In this way developing countries like Indonesia can overcome some of their problems in providing transportation according to their transportation needs.

#### 5.4. PORT ORGANIZATION AND PORT OPERATIONS.

Port management and port operations are intricate and interrelated matters. The solution to major port problems may not always be found in extending port facilities and or equipment, but also in organizational and institutional aspects, which, in many cases, have a wider scope and a far-reaching impact.

To develop all of Indonesian ports at the same time and at the same level of capability and capacity is impossible because their numbers are quite a lot and each port has different function.

But, consequently, to improve them significantly, in order to make them function with their limited facilities is important.

Therefore, improving the efficiency of existing ports are recommended. Port performance leaves ample room for improvement. The net benefits of such improvements are large.

The objectives and goals for improving port efficiency is to offer more sophisticated services to port users, so that the cost per ton of cargo handled is not increased due to low efficiency of the operations and to damage and pilferage of cargo.

Targets to be set for such improvement can be summarized as follows:

- a. Uniformity in working hours for port administration, customs and labour/stevedores, so that ships and cargo do not suffer delays from an unbalanced division of working time of various parties responsible for administrative and cargo handling operations.



- b. Introduction of work methods which are more compatible to cargo packaging, in order to avoid damage and breakage of cargo when loading and discharging
- c. To reduce ship's waiting time to a minimum (stream lining clearance procedures).
- d. To accelerate ship's turn round time, ( reducing port calls per voyage and increased gang hour productivity ).
- e. To increase through-put capacity per facility unit (of existing facilities).

Inadequate harbour facilities, lack of know-how, inefficiency, and usage of unsuitable vessels are commonly the key factors underlying those problems.

The economic consideration should be regarded as first factor in development of sea transport systems.

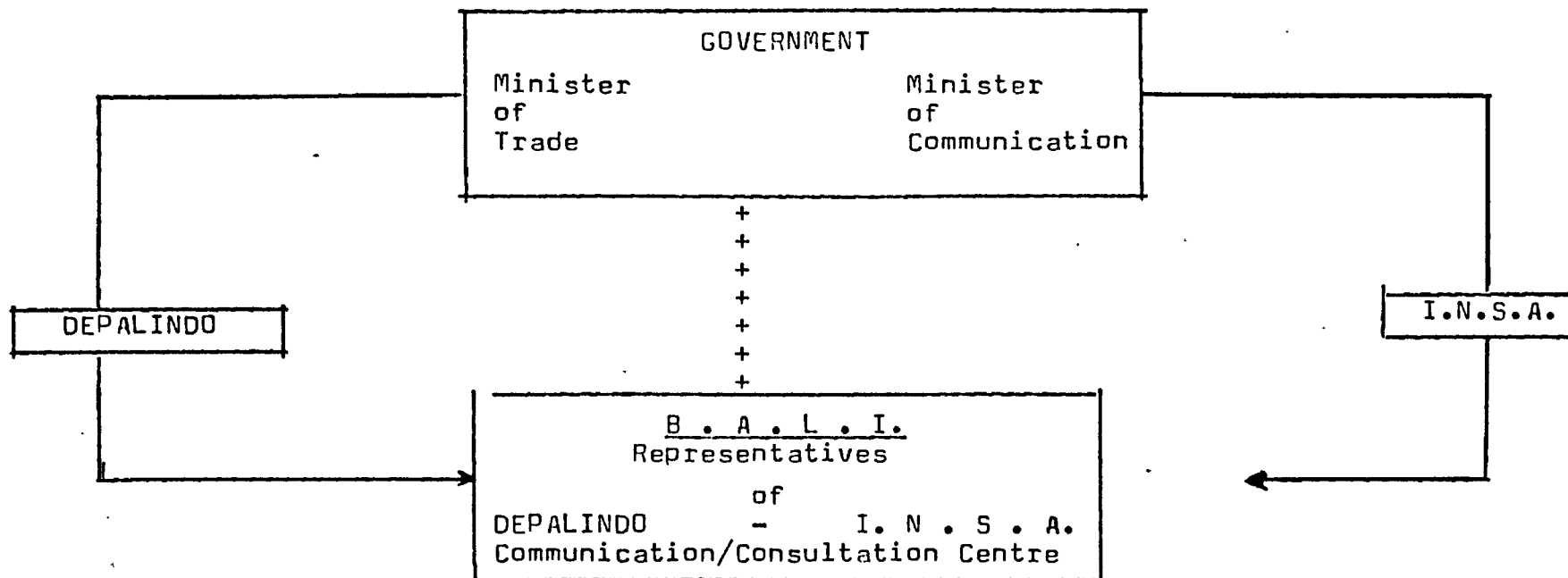
Finally, education and training of all personnel, including Government administration personnel is consequently important and is the answers to all questions for most of those problems.

\*\*\*

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+ Other Ministers (Departments) to take active part, a.o :

- Industry ;
- Agriculture ;
- Public Works ;
- Forestry etc. etc.

Establish direct contact between carriers (INSA) & Cargo Owners/Ship-pers (DEPALINDO)  
-Build up reasonable Freight Rates.  
-Standardization of package.  
-Reliable forecast of cargo movements.  
-Regular sailings, etc. etc.

+++++Consultative line ;

-----Developing/constructing line  
DEPALINDO =Board/forum of Indo-sian Ship Users;

I.N.S.A. =Indonesia National Shipowners Association

Source :

Indonesian National Shipowners Association (INSA).-

OBJECTIVES :

1. EFFICIENT, ADEQUATE AND RELIABLE  
SEA TRANSPORTATION.

KEY ISSUES :

- + Lack of adequate co-operation between Shipping Companies
- + Lack of adequate co-operation between Shipping Companies and cargo Owners/Shippers.
- + Strong role irresponsible brokers.
- + Lack of "Standard Packing & Measures "
- + Poor shipping performance - bad M/R (Maintenance & Repair)
- + High cost operation :
  - high cost vessel & vessel movements;
  - high cost port procedures/ cargo movements.

ACTION  
POLICIES / STRATEGIES

- (1). Conference ( Local )
- (2). BALI ( Consultation machinery between carrier and CO/Shipper)  
CO = Cargo Owners.
- (3). Shippers Council (Depalindo).
- (4). Unitization :
  - Seacom pallets
  - containers
- (5). Box rate for different commodities
- (6). Equipment (loading/unloading) in port and ship.
  - shore cranes.
- (7). LABOUR = YUKA or Shipping Coy.
  - training course.
- (8). Simplify custom procedures.  
if not: delay for Vessel/ CO.
- (9). Allow Master be pilots.
- (10). Less quarantine bureaucracy.
- (11). Shipping Companies operate Own tugs?

ventory.

+Standard ship type/ design.

+Cargo damage.

## 2. STABLE RATES/GOOD RETURN OF CAPITAL.

+Road/Ferry Service -strong competi-  
tion.

+Rate war-Brokers ;

-Lack of cargo (Gencar)

+High interest rate, and high operating  
cost.

+ No deferred rate payments-Banks  
(N-9 B/L Project ?).

(12). Needs service in the ports (all  
sectors).

(13). First come first served in the ports.

(14). Standardization to be well considered  
with varieties in size.

- again :labour =YUKA or shipping coy

- Stvedoring Companies ??

(1). Define qualifications for ferry (clear  
definition).

(2). INSA to coordinate Shipping Companies/  
members :

-local conference ;

-rate agreement.

(3). Disciplined rate behaviour ;  
"FMC" (Federal Maritime Commission)-  
price control.

(4). Soft loans (6%).

(5). Longer terms ( 20 years).

(6). Tax exemption/linear depreciation/in-  
vestment tax credit.

(7). Accelerated depreciation.

(8). Tax code.

(9). Market rate for bunker.

(10). Code of conduct/freight control.

- + Old vessels.
- + High cost economy.

- + Break bulk handling,
- + Customs.
- + Reluctant to pre-received cargo.

- (3). Encourage new building :
  - tax credit/no import duties for shipyard
  - no sales tax.
- (4). Unitization.
- (5). Pre-clearance of ships.
- (6). Shipping company also maintain fixed schedule of sailings.

#### 4. SUFFICIENT SPACE:

- + Standardized ship type.

- (1). Encourage building at Indonesia yards but at competitive price.
  - low cost financing for shipyards;
  - keep flexibility to allow other ship types such as Ro-ro or Lash.
- (2). National ship building program qualifies for low cost financing.

- + Long range planning.
- + Communicate with CO/Shippers.
- + Unitization/Container-impact on dock workers and crew.

- (3). Long range planning fleet.
- (4). INSA -BALI.
- (1). Training in dock work or as warehouse workers or in marine equipment or in shipbuilding.
  - Mobile training : YUKA ?

#### 5. EMPLOYMENT /GOOD WAGES.

- + More skills/specialization.
- + Who are employers/who train/relocate labour ?

- Shipping Coy ?
- Stevedore Coy ?
- (2). Training certification, and "graduated income tax scale.

- + Weekly Regular Service.
- + Improve " port facilities " (3). Good employment -new business.
- + Freight rate = cost based.
- + All ships important.

7. NATIONAL DEFENCE/EMERGEN-  
CY.

- BUNKER ..... + Expensive.  
+ Procedure too complicated.
- COAL ..... + Priority will be given to "log carriers" to carry coal.  
+ Needed : ships`type modification with equipment for loading/unloading of coal.
- SCRAPPING ..... + Scrapped vessels will gradually be replaced by standardized vessels (Caraka).  
+ Caraka type is final. First stage : 80 units to be built.  
+ INSA's considerations towards standardized vessels = - price ;  
= - interest rate ;  
= - without down payment.
- SUBSIDY IN THE U.S.A. .... + Domestic service = ships must be built in the USA (subsidy in price for shipyards)  
+ Ocean Going = operating subsidy.
- DOOR -TO -DOOR SERVICE ... + What are the shanges for the Shipping Companies and are they able to arrange  
this kind of service ?

Source :

Indonesian National Shipowners Association.(INSA).



*Free translation of the Decree:*

DECREE OF DIRECTOR GENERAL OF SEA COMMUNICATIONS

No. DAL. 13/2/5

according to

Composition of the traffic network and settlement of the  
local fleet for 1984 - 1989.

*Director General of Sea Communications*

To consider: a. That the traffic network and settlement of the inter-island regular liner services which is stipulated for 1984 - 1989 in the decree of the Director General of Sea Communications No. DAL.13/2/5 of December 22, 1983, it is need to adjust the traffic network of the local fleet as a feeder to the Inter-island regular liner services and as the development of the regions.

b. That is why it seems to be needed for readjustment of the traffic network and settlement of the local shipping fleet which were stipulated in Decree of the Director General of Sea Communication No. DAL 13/1/18 of December 13, 1981 into the new traffic scheme of the Interisland regular liner services.

Refer to : 1. Government Regulation No. 2 of 1969

according to the sea transportation activity rules.

2. Presidential decree No 44/45 of 1974  
Juncto Presidential decree No 47 of 1979.
3. Minister of Communications Decree No. KM  
8 / 1 / 25 - of January 28, 1969 according to the rules of shipping activities to / from abroad.
4. Minister of Communications Decree No.KM.  
164 / OT / 002 / PHB - 80 Of July 14,1980 according to organizational structure and job discriptions of the Ministry of Communications.
5. Decree of Director General of Sea Communications No. DAL. 1 / 41 / 9 of July 8, 1974, according to the rules of the local shipping activities.
6. Decree of Director General of Sea Communications No. DAL. 13 / 2 / 5 of December 22, 1983, according to the new traffic scheme of the inter-island regular liner service fleet for 1984 - 1989.

Refer to : 1. Recommendations according to the new traffic scheme for the local shipping fleet from the heads of the district I - IX.

2. Result of the meeting between the Directorate General of Sea Communication and all the Heads of districts, the Indonesian National Shipowners Association, the local Shipping association and all the Heads of shipowner districts I - IX of February 2, 1983.

*T O D E C I D E*

To draw up the decree of the Director General of Sea Communications No. DAL. 13 / 1 / 18 of December 31, 1981 according to the composition and settlement of the traffic network of local shipping of 1981 - 1983.

To stipulate: The decree of Director General of Sea Communications according to the traffic network and the settlement of local shipping of 1984 - 1989.

Firstly : Composition and settlement of local shipping for 1984 - 1989 as mentioned in this decree.

Secondly : All ships which were settled in the traffic network as stipulated in the first dictum, - have to sail on these new traffic network routes.

Thirdly : Deviations from the routes mentioned above are granted only by:

1. The Heads of the Sea Communications districts when the deviation occurs in their own region.
2. The Directorate of Sea traffic if the deviation are occurs among the regions.

Fourthly : All ships which were settled on these traffic network routes, by one month have to sail the routes mentioned.

Fifthly : Directorate of Sea Traffic by functional is in charge of the implementation of this decree.

Sixthly : The Heads of the Sea Communications Districts, Port Administrators and Harbour masters on duty to control of the implementation of this decree. Furthermore they have to submit reports accordingly to the Directorate of Sea Communications c.o. Director of Sea Traffic.

Seventhly : This decree is valid since the date of issue.

Issued in : Jakarta

Date of: December 22, 1983.

-----  
signed by

P. SOEPARDJO.

-----  
NIP. 120003631.

*Carbon copies of this decree are submitted to:*

1. All of the Coordination Ministers.
2. All Ministers.
3. The State Minister.
4. The Chief of Military Command.
5. The Governor of the Indonesian Bank.
6. All vice Ministers.
7. All Governors of Provinces.
8. All Directors General at the Ministry of Communications.
9. All the Heads of Sea Communications Districts.
10. All Communications attaches.
11. All Ports Administrations and Harbour masters.
12. The Chamber of Commerce of Indonesia.
13. The Indonesian Oil Company ( PERTAMINA ).
14. Indonesian National Shipowners' Association.

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